METHOD AND APPARATUS FOR USER AND DEVICE COMMAND AND CONTROL IN A NETWORK

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Method and system for performing a service on a home network having a plurality of home devices connected thereto, by: connecting a client device to the home network for displaying a user interface; executing a software agent on the client device for obtaining selection information for the network devices and displaying the selection information on a user interface displayed on the client device; selecting a first home device connected to the network from the user interface being displayed on the client device; reading first capabilities data for the first home device, where the first capabilities data includes information in a structured format for identifying the capabilities of the first home device; reading second capabilities data for a second home device connected to the network, where the second capabilities data includes information in the structured format for identifying the capabilities of the second home device; comparing the first and second capabilities data of the first and second home devices, respectively; selecting the second home device from the user interface displayed on the client device; and sending control and command data from the client device to the first and second home devices to cause the first and second home devices to communicate with each other to perform the service.

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CLAIMS

[Claim(s)]
[Claim 1]In a method for giving one's service on a home network, it is (a). A stage of connecting the 1st home device to said home network, (b) A stage of connecting the 2nd home device to said home network, (c) As a stage of providing a database containing two or more application interface explanation data objects, A stage where each application interface explanation data object includes information for a command of a home device, and control in a format structurized by one or a home device beyond it connected to said network, (d) A stage where said 2nd home device accesses a candidate for the 1st application interface explanation for said 1st home device in said database, (e) A stage where said 1st home device accesses a candidate for the 2nd application interface explanation for said 2nd home device in said database, (f) A stage of transmitting a command and control data to said 2nd home device from said 1st home device through said network using said candidate for application interface explanation for said 2nd device, (g) A stage of transmitting a command and control data to said 1st home device from said 2nd home device through said network using said candidate for application interface explanation for said 1st device is included, How to provide service on a home network, wherein said 1st and 2nd home device offers said service by that cause.
[Claim 2]A method according to claim 1, wherein said structurized format includes an XML format.
[Claim 3]A method according to claim 1 which the aforementioned (c) stage is a stage of connecting a database device to said network, and is characterized by said database device containing said database.
[Claim 4](i) Said 1st home device stores said 1st application interface data, (ii) said 2nd home device stores said 2nd application interface data -- (iii) -- the aforementioned (c) stage, In order to transmit said application interface data for said 1st and 2nd home device to said database device. A method according to claim 3 including an initialization stage which forms said

database by a stage including asking said 1st and 2nd home device.
[Claim 5]A method according to claim 1, wherein the aforementioned (d) stage includes a stage of providing said 2nd home device with a candidate for the 1st application interface explanation for said 1st home device from said database through a network.
[Claim 6]A method according to claim 1, wherein the aforementioned (e) stage includes a stage of providing said 1st home device with a candidate for the 2nd application interface explanation for said 2nd home device from said database through a network.
[Claim 7]As a stage of connecting three or a home device beyond it to said network, At least one home device in order to ask a candidate for application interface explanation of two or more home devices for transmitting a command and control data to two or more home devices through said network. A method of including further a stage which accesses a database according to claim 1.
[Claim 8]A method according to claim 1, wherein each candidate for application interface explanation contains data in a structurized format.
[Claim 9]A network system characterized by comprising the following for providing service.
(a) The physical layer which provides communication media used by a device which carries out two-way communication.
(b) The 1st home device.
(c) The 2nd home device.
(d) Each candidate for application interface explanation is the information for a command of a home device, and control by format structurized by other devices beyond one or it connected to said network.

[Claim 10]The network system according to claim 9, wherein said structurized format includes an XML format.
[Claim 11]The network system according to claim 9 by which a database device which stores said database being included further.
[Claim 12](i) Said 1st home device stores a candidate for the 1st application interface explanation, (ii) said 2nd home device stores the 2nd application interface explanation data -- (iii) -- said database device, The network system according to claim 11 forming said database by asking said 1st and 2nd home device in order to transmit said candidate for the 1st and 2nd application explanation to a database device respectively.
[Claim 13]The network system according to claim 9, wherein a control application means of said 2nd home device obtains a candidate for the 1st application interface explanation for the 1st home device from said database.
[Claim 14]The network system according to claim 9, wherein a control application means of said 1st home device obtains a candidate for the 2nd application interface explanation for the

2nd home device from said database.
[Claim 15]At least one home device, In order to ask a candidate for application interface explanation of two or more home devices for transmitting a command and control data to two or more home devices through a network. The network system according to claim 9 by which three or a home device beyond it which accesses a database being included further.
[Claim 16]The network system according to claim 9, wherein each candidate for application interface explanation contains data in a structurized format.
[Claim 17]The network system according to claim 9, wherein said structurized format includes an XML format.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001][Field of the Invention]

This invention relates to the network system field, and it is related with the home network which possesses more two or more devices connected with it in details.

[0002][Description of the Prior Art]

Generally, a network contains the various devices which have the communication capability connected with the communication link and said communication link. Said device contains a computer, peripheral equipment, a router, a storage device, and the product possessing a processor and a communication interface. Devices various as one network embodiment can mention the home home network by which interconnection was carried out. The ordinary home can contain various devices containing the home device typically found in a personal computer and a home. The "device" as a term can contain other devices provided with the capability to exchange a logical device or functionality, and data typically, and can contain not only all the home devices but a general purpose computer. A home device A security system, movie theater equipment, TV, VCR, stereo equipment, The direct broadcast satellite service (DBSS: Direct Broadcast Satellite Services), water-drench system, lighting system with which digital satellite services (DSS: Digital Satellite Services) were known, A microwave oven, a dishwasher, oven/stove, a washing machine/oven, and an electron device like a processing system automatic in the car are included.

[0003]Generally, a home device is used in order to raise a landlord's life style and living standard. For example, a landlord does not need to wash tableware directly by hand by washing dirty tableware with a dishwasher. In VCR, TV program can be recorded so that a landlord may look at a specific program later. A security system protects a landlord's valuables and the anxiety of the landlord by the invader who is not desirable is reduced.

[0004]A home device like home movie theater equipment is controlled using a good single

common control unit, i.e., a remote control. A landlord controls other home devices variously and enables it to order said single common control unit using a single interface. Therefore, the manufacturer has developed the control unit for controlling the home device and ordering from a single interface.

[0005]I hear that the demerit about the use of a remote control unit which controls a home device and is ordered provides the static command logic for controlling each home device and ordering, and there is. Other demerits about use of the remote control unit, I hear that a known remote control unit cannot control two or more various devices, and I hear that it is and two or more devices which have the different compatibility for carrying out two-way communication in order to work in details or to provide service cannot be controlled more, and it is.

[0006]With the conventional network system, a user provides a command using a remote control unit or a device control panel. If a user stops once, the control unit and device which provide the command for automation in a network will be lost. . It is indispensable, in order that the conventional system may work without a user not controlling the 2nd set of a device directly, and ordering it, after a user controls the 1st set of a device in early stages and orders. The mechanism for the 1st set of the device which communicates with the 2nd set of a device automatically in a network is not provided. The conventional system does not provide the efficient method of acquiring information to other network devices, in order that various network devices may perform command and control in a network.

[0007][Problem(s) to be Solved by the Invention]

Therefore, the method and system which provide the dynamic control of a device and a command are required of a home network. In order to work or to provide service, the method and system for providing the capability for two or more devices which have the performance which is different in carrying out two-way communication to be controllable are required. The method and system for providing the capability for various network devices to order automatically and to control other various network devices further are required. The method and system for providing the command and control information which are accessed general-purpose because of communication between devices are required.

[0008][Means for Solving the Problem]

This invention fulfills this necessity. A method and a system for this invention to give its service on a home network by a 1st embodiment are provided with the following.

A stage of connecting the 1st and 2nd home device to said home network.

As a stage of providing a database containing two or more application interface explanation data objects, A stage where each application interface explanation data object includes information for a command of a home device, and control in a format structurized by one or a home device beyond it connected to said network.

A stage where the 2nd home device accesses a candidate for the 1st application interface

explanation for said 1st home device in said database.
A stage where said 1st home device accesses a candidate for the 2nd application interface explanation for said 2nd home device in said database, A stage of transmitting a command and control data to said 2nd home device from said 1st home device through said network using said candidate for application interface explanation for said 2nd device, A stage of transmitting a command and control data to said 1st home device from said 2nd home device through said network using said candidate for application interface explanation for said 1st device.
Thereby, said 1st and 2nd home device offers said service.
[0009]With one gestalt of this invention, said 1st home device stores the 1st application interface data, and said 2nd home device stores the 2nd application interface data. Said database is formed by asking the 1st and 2nd home device, in order to transmit said application interface explanation data for the 1st and 2nd home device to said database device. Said database is stored in a database device, or is connected to a network for general-purpose access by network device. Therefore, the 2nd home device is provided with a candidate for the 1st application interface explanation for said 1st home device from a database through a network. The 1st home device is provided with said candidate for the 2nd application interface explanation from a database through a network.
[0010]Three or a home device beyond it is connected to a network, At least one home device accesses a database, in order to ask a candidate for application interface explanation of two or more home devices for transmitting a command and control data to two or more home devices through a network. Each candidate for application interface explanation has data in a structurized format. Said structurized format has an XML format.
[0011]The feature, a viewpoint, and an advantage of such this invention should be understood still better with following detailed explanation, a claim, and an attached drawing.
[0012][Embodiment of the Invention]
By one viewpoint, this invention provides communication between devices in a network like a home network. If a home device becomes more intellectual and information can be shared, it permits that the communication between devices carries out interconnection of the device in a network that a user has so that [the information-sharing performance of said device] it may be used. Similarly, in giving the capability to use flexibly enough the device connected with the network for a user, the communication between devices carries out a decisive role.
[0013]If drawing 1 is referred to, the network 10 contains at least one client device 12 and at least one server device 14 which were linked through the communication link 16 by one embodiment of this invention. The communication link 16 can include 1394 serial buses which provide a physical hierarchy (medium), in order to transmit data and to receive between the home devices connected variously. Said 1394 serial buses support a time-multiplexing audio /

video (A/V) stream, and standard IP (Internet Protocol) communication both. By an embodiment, a home network uses an IP network hierarchy as a communication hierarchy for a home network. However, since other communications protocols provide a home network with communication, it may be used.

[0014]Each client device 12 can communicate with the server device 14 beyond one or it in the network 10. Each server device 14 can communicate with one or other server devices 14 beyond it and one, or the client device 12 beyond it in the network 10. Each client device 12 can include a user communication interface including the display which provides a control user interface so that it may interact with the device with which an input device like the mouse for receiving a user's input and a keyboard was connected with the network in the user. The user interface can include the GUI (Graphical User Interface) display 18 for providing a user with information. If drawing 2 is referred to, as it defined here, each server device 14 provides for a user the service which excepted the control user interface, and each client device 12 provides a control user interface for the user who interacts with the network 10. Thus, only the client device 12 interacts a user and directly and the server device 14 interacts only with the client device 12 and the server device 14. For example, the service can include MPEG sourcing / sinking, and display service.

[0015]Drawing 3 is a block diagram showing the example of the home network 10 containing many client devices 12 and many server devices 14. Each server device 14 can contain hardware as resources for providing service for a user in a network. Furthermore, each server device 14 can store the server or the service control program 20 for controlling server hardware, As shown in drawing 4, the graphic controlled object (GCO: Graphical Control Object) user interface description 22 for a user interface can be included with the server control program 20.

[0016]For control between the control client device 12 and the controlled server device 14, the client device 12, For example, GCO22 of the server device 14 is accessed by transmitting GCO22 to the client device 12 from the server device 14 through a network. Then, GCO22 transmitted in order to create control user interface GUI18 for the user who communicates with the control program 20 of the server device 14 from the client device 12 through a network is used for the client device 12. A user provides the control program 20 of the server device 14 with control and a command from the client device 12 at least.

[0017]GCO22 storage of each server device 14 contracts processing of the client device 12, and a storage demand by the server device itself in a network with some server devices 14. Storing GCO22 with the server device 14 permits that each server device 14 provides a user with the GUI gestalt of the very thing, and sensibility, and it permits the correction or updating of GCO22 without correction with the client device 12.

[0018]If drawing 4 which provides the command and control between the client device 12 and

the server device 14 by an embodiment is referred to, said client device 12, Renderer (Renderer)24 for being stored in the client device 12 or displaying GUI18 using GCO22 transmitted to the client device 12 through the network from the server device 14 of hope can be included. For example, said client-server 12 can fetch GCO22 of at least one server device 14 through a network by an early device selective state, Said renderer 24 displays GUI18 using GCO22, in order to control said server device 14. Desirably, said GUI18 is customized with the server device 14, and can contain the built-in instruction set made in order to control the server device 14.

[0019]Various GUI18 of the server device 14, For example : (1) The common GCO model type for the client device renderer 24 which displays GUI18, (2) The common communications protocol for transmitting GCO22 to the client device 12 from the various server devices 14, (3) To the control program 20 of the server device 14 corresponding from the client device 12 which does not search for the knowledge made with the control program of the server device 14 with which the specific server device 14 controlled corresponds a community like the common communications protocol for a GUI interaction. It can contain.

[0020]If drawing 4 is referred to again, the server device 14 can contain one or the server control program 20 beyond it which controls server hardware, in order to provide service. The GUI interface 18 provides the server device control programs 20 with an interface from GCO22 of said server device 14. Said server device 14 can contain the control state data 26 which points out the control state of the server device 14 and server device hardware in providing the called-for service.

[0021]For example, the control state data 26 can include the state of control information by GUI18 for the server device 14 like the timer settings set up in order for a VCR server device to perform recording operation. The control state data 26 is stored in the controlled server device 14, and is displayed by the user through GUI18 of the server device 14 with the control client device 12 for user control of the server device 14. Desirably, the control client device 12 for displaying GUI18 of said server device 14 does not maintain the knowledge of the control state data 26 for the controlled server device 14.

[0022]Each server device 14 is controlled by one or the client device 12 beyond it. Therefore, the control state data 26 stored in said server device 14 includes the information state in GUI18 of the server device 14 with each control client device 12. For example, if user control is completed when a user controls the server device 14 using the 1st client device 12, The information in GUI18 of the server device 14 is stored in the control state data 26 of the server device 14 by the server device 14 with the 1st client device 12.

[0023]While a user interacts with GUI18 of the server device 14 with the 1st client device 12 on the other hand, The control state data 26 of said server device 14 is updated with the 1st client device 12 by the information in GUI18 of the server device 14, and if user control is completed,

said control state data 26 will be maintained with the server device 14. When a user controls the server device 14 using the 2nd client device 12, said control state data 26 is made so that a user can use through GUI18 of the server device 14 with the 2nd client device 12 for the control which follows. In order that a user may control the server device 14 again henceforth, the 1st client device 12 can be used, Said control state data 26 is made here so that a user can use through GUI18 of the server device 14 with the 1st client device 12 for the control which follows. Since the clock 28 is included again, or the time delay operation based on the time or the clock inputted by the user is permitted so that it may be mentioned later, said server device 14 can maintain current time.

[0024]The client device 12 and the server device 14 can be physically connected with one unit together, for example like DTV. In that case, said client device 12 provides the server control program 20 with a control user interface at least including the control program 20 for said server device 14 to control server hardware for control of server hardware, and a command. Drawing 5 is a drawing in which the example of the client device 12 is shown, and is (1). PDA for a GUI display (RemoteC), (2) DTV (STB) containing the sink server which displayed GUI and comprised an audio and/or a video program stream destination server, (3) GUI is displayed, and in order to provide multiplex service, PC containing at least one server device can be included. The hardware or the thing which can be performed in DTV or PC client device is controlled by other client devices. Drawing 6 is a drawing in which the example of the server device 14 is shown, and is (1). DVDP SmartCard as a sauce server device, (2) The audio amplifier as a sink server device, and (3) DVCR as sauce or a sink server device, and (4) The managing server for managing a remote server device is included. Said managing server can contain DSB-STB, cable TV-STB, or ATSC-STB. Such a device contains the managing server for the local control of STB internal work, or management. The external server accessed through the external network may be used by the local client device, for example for service like Video-on-Demand, Enhanced-TV, and Internet commerce.

[0025]If drawing 7 is referred to, the communication and control between the two server devices 14 will be performed by the control program 20 of the server device 14 which communicates the instruction word and control data of these between. The server device 14 can control one or other server devices 14 beyond it through a network. And the server device 14 is controlled by one or the server device 14 beyond it and one, or the client device 12 beyond it. In order that a user may control and order the 1st set of the server device 14, can use the client device 12, and the 1st set of said server device 14, Without the ability to confuse [it is indispensable in order to give its service to a user, and] a user, it orders automatically and the 2nd set of the server device 14 can be controlled.

[0026]For example, in order to perform automatic time-delaying operation, a user "logs on" to the client device 12 which controls the 1st set of the server device 14, and can specify service

of hope. And a user "logs off" off said client device 12. Since communication and control are performed among these very thing and one or the server device beyond it provides service of hope without a user's intervention in the gross by the 1st set after that, the 1st set of the server device 14 is indispensable, and it controls the 2nd set of the server device 14 automatically.

[0027]Drawing 7 is a drawing in which the embodiment in which the two server devices 14 carry out two-way communication, and which they control is shown. Each server device 14 contains the control program 20 mentioned above, the clock 28, and the control state data 26 mentioned above. Each server device 14 can contain GCO22 by which the server device 14 is controlled directly with the client device 12 again. However, GCO22 does not need to be controlled directly by the client device 12, and does not need to be contained in the server device 14 which merely communicates with other server devices 14. Each server device 14 includes the instruction word (CL: Command Language) interface 30 and an instruction word library again. Since said server device 14 provides the service, said instruction word library includes the command which uses information for transmitting and receiving. however, drawing 4 -- and as mentioned above, an instruction word is not certainly required because of user control.

[0028]Drawing 8 shows the example of the audio / video (A/V) model which contains the sauce server device 14, the sink server device 14, and the client device 12 in a network. Said sauce server device 14 contains the control program 20 for controlling the data stream sauce hardware 32 of the sauce server device 14, Said sink server device 14 contains the control program 20 for controlling the data stream sink hardware 34 of the sink server device 14. In order that a user may work the data stream sauce hardware 32, the sauce server device 14 is controlled by illustration operation, and in order to work the data stream sink hardware 34, the client device 12 which controls the sink server device 14 is used. In initializing the data communications from the data stream sauce hardware 32 to the data stream sink hardware 34, a user gives up said client device 12. Because of other one side, the user can program future initial-data transmission and gives up the client device 12. The data stream sauce hardware 32 of the sauce server device 14 and the data stream sink hardware 34 of the sink server device 14 initialize data communications automatically henceforth at the time programmed by the user.

[0029]For example, said data stream sauce hardware 32 can contain a tuner access device like direct broadcasting by satellite (DBS: Direct Broadcast Satellite). DBS is a multiplex-channel replaced with cable TV, and provides a small satellite disk (3 foot 18 inches in diameter) with television programming like a cable directly from a satellite. It permits that 200 or more channels also receive the satellite disk located in the place where some standard analog TV signals were compressed in digital one by the single satellite transponder, and the air was specified with DBS. Said data stream sink hardware 34 can contain the command and

digital video cassette recorder (DVCR) which can carry out decoding of the digital video signal compressed at the time of reproduction. A user provides the command and control data containing the "time-delay recording" event data for DVCR, and the "time-delay selection program" event data for a tuner access device. Said tuner access device chooses the program of hope after time delay, and from a user, even when he has no additional control operation, DVCR which receives and records program data is provided with source program data.

[0030]Furthermore drawing 9 contains sauce server device 14 SERVER1, sink server device 14 SERVER2, and the client device 12 in a network at least, it is a drawing in which other A/V models are shown. In order that said client device 12 may choose and control server device 14 SERVER1, and SERVER2 and other server devices 14, for example, SERVER3 and SERVER4, (not shown), The administrator 36 with the user interface which displays the selection information for a user is included. Selection information contains the icon symbol assigned to Serv1, Serv2, Serv3, and Serv4 by the session management person 36 for the user who chooses respectively server device 14 SERVER1, SERVER2, SERVER3, and SERVER4. Said sauce server device 14 SERVER1 can contain DVCR, and said sink server device 14 SERVER2 can contain 1/2DTV.

[0031]as an example of operation -- the server device 14 -- in selection of SERVER1 and SERVER2, Said client device 12 transmits GCO22 of each server device 14 to a client device, and displays each server device 14 SERVER1 and GUI18 corresponding to SERVER2. The user can interact with control and GUI18 of each server device 14 which provide a command to the server device [/ for service] 14. Each server device 14 is combined with the server device 14 of independent or others, and can provide service. In order to give one's service, the server device 14 needs said session management person 36, and he transmits the control state data 26 between GUI18 of said server device 14 with said client device 12. Based on user control and instruction information, the two or more server devices 14 can communicate a command and control information in between [these], in order to provide the service for which a user asks.

[0032]Said session management person 36 can contain the software agent who has a function which accesses the useful home network service provided by the various server devices 14, and displays it in the network 10. Said software agent adjusts the performance of the various server devices 14 in the network 10 additionally, and the selection information only for said server device 14 which has compatible performance is displayed. The selection made from GUI18 of the one server device 14 so that a user might provide the command and control information where the server device 14 has a meaning, and the selection made from GUI18 of other server devices 18 are adjusted by the session management person 36.

[0033]The session management person 36 searches a network with the example of further others of operation, and performs in it the software agent who finds the server device 14

connected to the network. Said software agent accesses the performance data stored in each server device 14, in order to opt for the performance of the server device 14 again, and he provides a user with the information over the performance. And said session management person 36 displays selection icon Serv1, Serv2, Serv3, and Serv4 for server device SERVER1, SERVER2, SERVER3, and SERVER4, as shown in drawing 9.

[0034]Said session management person 36 makes all the selection icon Serv1, Serv2, Serv3, and Serv4 enable in early stages so that a user can choose in all the four icons. After a user clicks on a Serv1 selection icon and chooses server device SERVER1, said session management person 36 determines that he cannot carry out the performance top compatibility of the server devices SERVER3 and SERVER4 with server device SERVER1. Therefore, said session management person 36 does the disable of the selection icons Serv3 and Serv4 respectively for the server devices SERVER3 and SERVER4. And the user can click on the icon Serv2, in order to order and control server device SERVER2.

[0035]Like interacting with GUI18 of the server device 14 with which the user was chosen, the control and instruction information which were inputted into each GUI18 by the user provide the additional performance information which has on the server device selection which follows by a user. For example, if the VCR server device 14 is chosen, it will be influenced by the determination of the user on whom operation of succession by the session management person 36 plays or records the selection icon for other server devices 14 in enabling or carrying out a disable.

[0036]In a network, each server device 14 has one or the service performance beyond it, as mentioned above through the example about the server device shown in drawing 9. Each service performance contains sourcing or sinking of information. TV has the sinking performance which receives video and an audio stream -- VCR -- video and an audio signal -- sauce (transmission) -- and a sink (reception) can be carried out, and PC can transmit and receive video, an audio, and data. Each sourcing performance has complementary and interexchangeable sinking performance. In this and resemblance, each sinking performance has complementary and interexchangeable sourcing performance. For example, video output performance is complemented with one device by the input video performance of the device of further others.

[0037]an other services with each devices 14 various on a network sake -- sauce -- or since a sink is carried out, as shown in drawing 10, each device 14 stores a performance data table (performance table 1). The 1st row of the table 1 checks the service performance of the device 14, and said device 14 checks sauce or sink **** for the service corresponding to the 1st row in the 2nd row. New service is performed using the performance data table 1, while maintaining still older device and compatibility. For example, if still older service and the new service by which compatibility is carried out are developed, An execution device can be written in the

performance data table 1 for the device which offers said new service as it maintains the old device and compatibility which use service with both old new service and old service.
[0038]By a 1st embodiment, a device administrator performs matching or comparison of sauce and a sink service device. For example, said device administrator can also perform the role of the software agent who compares the performance and the characteristic of the various devices 14 and the specified device 14 with compatibility matching. Service even the 2nd device 12 from the 1st device 14 over a network In for example, the case of a media stream. the 2nd device 14 with which compatibility of the user is carried out to the performance of the 1st device 14 for said device administrator -- judgment -- the performance of the 1st and 2nd devices 14 is compared so that it may be powerful and can choose. Next, the example of the service performance list of [for the embodiment of the server device 14] is shown. Stream_format_video_dv Stream_format_video_mpeg2tpt Stream_format_video_dsstpt Stream_format_video_mpeg2pes Stream_format_ video_mpeg210901-tpt [0039]As shown in drawing 11, each device 14 stores further the characteristic data table (characteristics table 2) containing the characteristic about a device. A name and a price define each characteristic by the table 2. It is not required although character length is shown in the table 2. Said characteristic data is useful to other devices 14 which make information processing interoperability easy on the network 10, and store device information. For example, a device page uses the characteristics table 2 which stores a device name so that it may be mentioned later. Other fields can be added to the characteristic data table 2, when required.
[0040]With the user-client device control model mentioned above, characteristic data is displayed on the GUI page of the server device 14 with the client device 12. Since said characteristic data is displayed, the 2nd level device information homepage may be used for others. A text or the characteristic data of the gestalt of an XML (Extensible Markup Language) file may be accessed by the software agent. The characteristic data for the device controlled for the device device control model is stored in a device interface and an application interface.
[0041]With the characteristics table 2, said device position-characteristics field is used in order to store the position or group for each device 14. The device type characteristic field writes in the device type for the specific device 14 like VCR, DVD, DTV, a camcorder, PC, and a security system. Supposing the device itself does not supply a device icon, said device type characteristic field will be used in order to select the default device icon which expresses a device on a device page. The characteristics table 2 can include the multiplex writing for default sauce and the default sink characteristic field. Such each writing expresses other default sauces or sink devices 14 for each data type processed by the device 14.
[0042]Desirably, performance and characteristic data are packed by the data structurized using the hierarchy language. This provides the performance used for other purpose like GCO transmission and server device server device control, and the common method of recovering

the characteristic. For example, characteristic data can include the data format by which the next was structurized.
<DEVICEATTRIBUTES> <ATTRIBUTE name=DeviceManufacturer value="Samsung Inc."> <ATTRIBUTE name=ManufacturerURL. value=www.Samsung.com>. <ATTRIBUTE name=ManufacturerIcon value="logo.gif"> <ATTRIBUTE name=DeviceName value="Samsung DSS"> <ATTRIBUTE. name=DeviceModel value="SCH1900" > <ATTRIBUTE name=DeviceType value=DDS> <ATTRIBUTE name=DeviceLocation. value="Livingroom">. <ATTRIBUTE name=DeviceIcon value="device.gif"> <ATTRIBUTE name=DeviceAddress value=105.144.30.17> </DEVICEATTRIBUTES> [0043]As an example, the performance data can include the format by which the next was structurized.
<DEVICECAPABILITIES>. <CAPABILITY type=MPEG 2. value=Source> <CAPABILITY. type=MPEG2 value=Sink> <CAPABILITY type=MPEG3 value=Source> <CAPABILITY type=MPEG3 value=Sink> </DEVICECAPABILITIES> [0044]An application interface language is used so that other server devices 13 may perform device device control including a server device server device. It can be described using XML that said application interface language was later mentioned including the instruction word. The control program 20 of the one server device 14 controls the control program 20 of the server device 14 of further others without a user's intervention distantly through a network, not using GUI18. The example of control of a device device is automation. since control through the client device 12 is provided and a user subsequently provides [the two or more server devices 14] service in early stages for service of hope, even when it has no interaction of a user, he is mutual -- it communicates automatically and controls.
[0045]If drawing 12 and drawing 13 are referred to, it will be used so that information processing interoperability may be permitted among the various control programs 20 in the desirable server device 14 with a various standard application interface language. By one embodiment, said standard application interface language, (1) of the following configuration blocks The functional standard block 40 of service like a service-function database, and (2) The block (42) with which a message element is constituted, (3) The industrial standard format block 44 and (4) The message character string configuration block 48 which outputs the message compressed block 46 and the structurized message data is included.
[0046]Drawing 12 is a drawing in which the example of composition of the configuration block which performs a command message generating function is shown. Each message item comprises a functional standard of service, and is standardized by choosing an industrial standard compression form (Hex) label to a message item. A group like a message item is together put in order to make a perfect instruction-character sequence. The instruction word which exists like CAL and AV/C operates, as shown in drawing 12. However, the instruction word mechanism specifies binary code or a hexadecimal-code message, and a system

operation to a physical unit on a physical interface, and is based on hardware regulation. therefore, the application level which the one software application program 20 in the controller device 14 specifies the position of the software application 20 of further others in the device 14 by which it was controlled on the network, and the instruction word controls -- that is, It is not so desirable to the network hierarchy based on the control mechanism of the control system standard which contains a name, an address, device performance discovery, communications language, and a command message on a software level. Said control mechanism is further suitable to a device like the digital device containing versatility like a computer, and not only a multiplex application device but a device like DVCR.

[0047]Drawing 13 is a drawing in which the desirable example of the configuration block of drawing 12 which performs a command message generating function is shown. By drawing 13, the position of the industrial standardization format 44 and the message compression 46 differs from drawing 12. Many text normalization forms are chosen from the functional standard service 40 which makes a perfect message. Said message is later compressed by the lower hierarchy of a protocol stack. Drawing 13 expresses how to perform service or device command, and control to electric appliance CE. Message composition is defined by XML standardization syntax and message compression is performed by protocol hierarchy of further others like HTTP. Command interface language is used for an application software 20 interface level rather than a low rank hardware level. Therefore, a network protocol stack is managed with the command in said language, and each controller device 14 and the controlled device 14 are shown as composition with which the network was unified for the message transmission of these between.

[0048]If drawing 14 is explained, three embodiments of three interactions between the client device 12 and the server device 14 are shown. A user communicates with remote service application"S" by "A" a 1st embodiment. Although said user uses a browser with a client device as a user interface, Asynchronous instruction message posting of .XML base which said browser controls the service program 20 by service application"S" here, and receives a response in HTML (Hyper Text Markup Language) or an XML format. The second server provided with the browser to accept is contained. For example, in DVCR, the second server 14 accepts a command message like "VCR FAILED:TAPE BROKE". Since the command message for a user displays within GUI of a browser for control of the succession attention by a user, and DVCR, the software agent containing a browser is used. Desirably, the client device 12 of an XML base includes the HTTP1.1 server performance which answers the command initialized elsewhere for server device versus server device control, and a command.

[0049]A user is exchanged by the software client control program 50 by "B" a 2nd embodiment. Said software client control program 50 generates command posting to service

application"S" of an XML base, and receives XML command posting replied. And said software client control program 50 is exchanged by "C" a 3rd embodiment by application [like the server device control programs 20 exchanged between the two service applications 20] whose command and response are. In this point, it is when embodiment "embodiment in which B" has NARU (Null) service" C" is special.

[0050]The application interface language based on XML, It is used in order to control between the 1st server device 14 and the 2nd server device 14 (a device pair-device or service pair-service) for the device enabled by World Wide Web or the Internet or service. An application interface language is due to a web standard and a middleware hierarchy. By one embodiment, it includes that device device control controls the control program 20 or application by the network 10 distantly with the one server device 14 from the server device 14 of further others. Therefore, the interface (API) to the application 20 can be used through the network which uses API extension. Desirably, said API extension uses a standard format like an interface based on XML, in order to provide the whole information processing interoperability.

[0051]Drawing 15 is a block diagram showing the API extension for the 2nd application B designed as the 1st application A and B designed as the service A which communicates within a network. For example, the service A is a control program for the 1st server device A in a network, and the service B may be a control program for the 2nd server device B in a network. The server device B transmits a command to the server device A. For example, the 1st and 2nd service devices A and B contain CE device.

[0052]If the API extension for the service A is referred to, the 1st top block 52 provides a synthetic definition or database of the method for CE using the English word explaining CE device. The synthetic definition or database which uses .XML which can exist in other formats as which said synthetic definition or the database can express C, XML or an object, and the method of these each one is called a XCE definition. 54 provides the 2nd block of the format which expresses API by XML form for all the devices 14 designed by interface data-type definition INTERFACE.DTD.

[0053]The software agent designed by the means A uses the subset of the XCE definition for the service A, and uses interface data-type INTERFACE.DTD for the service A which generates an XML gestalt document, and INTERFACE-A.XML. Said document INTERFACE-A.XML explains the object and method which are supported by the service A according to document type definition INTERFACE.DTD for the service A. Other data-type definitions are used in order to draw up an INTERFACE-A. XML document again.

[0054]The software means A generates again the look rise table 56 compiled by the look rise table 56 changed from the XML message to the service A programmed by C, and the binary number which can be performed from the service B on a network interface. The look rise table 56 is desirably created by compile time, The method (Method) message (command) of an XML

gestalt inputted from the service B is changed into the API form created by the application C code compiled for the service A between ****- times here. Said look rise table 56 provides the ****- time translation changed into a request peculiar to the device for A as method request service for XML. The look rise table 56 is compiled with the device control programs 20 for execution local on the server device A for the service A.

[0055]INTERFACE-A.XML is used by the service A for the Tokimasa this sex check which the error generated by the received message. Before INTERFACE-A.XML communicates with the service A again, it is used by external application like the service B which determines the message format for the service A. If the message to the service A generates an error from the service B, the service B can access an INTERFACE-A. XML document, in order to diagnose an error.

[0056]If the API extension to the service B is referred to, the synthetic definition or database for [like a XCE definition for said service A of the above / 58 / the 1st block] CE is provided. The following block 60 provides the remote API service or the device like API for the service A with the language definition for the XML gestalt method (command) call. Said language definition is document type definition method request CALL.DTD which explains an interaction with an object on a network.

[0057]The software agent designed by the means B, In order to create the look-up table which changes into an XML form method request C program code compiled in the command for the service B, the object within the XCE regulation for the service B and the subset of a method are used at least. Therefore, the look rise table 62 provides conversion between the XML document which crosses a network interface with the method and the service A which were caused by the service B (for example, "reproduction"), and performs a method call, or a message, for example. The subset of the XCE definition used by the software means B is dependent on network use extension and essence. For example, said subset can be chosen in order to provide the use which all the possible services were comprehensive, or was restricted on a home network.

[0058]Therefore, said API extension provides communication among devices various on the network which uses XML. In the aforementioned example, the program code 20 for the service B generates a method call by API, The .XML method call (message) from which an API call is changed into the web / Internet standard XML for internal-device communication in an XML gestalt at conformity is transmitted to the service A through a network, The service A reconverts the XML method call from a network interface to the program code API definition for the service A. Said conversion and re converts provide the web / Internet compatibility for the various devices in the network which has program code API which requires binary compatibility of ** among other devices. The embodiment of the XML interface block which uses the block diagram in drawing 15 is shown below.

---------- interface.dtd rules for describing an object interface in xml ---------- <!ELEMENT parameter. # PCDATA><!ATTLIST parameter. valueCDATA #REQUIRED><!ELEMENT method (#PCDATA,(parameter)+)><!ELEMENT object (#PCDATA)<!ELEMENT call (object, (method)+)> ---------- interface.h example object interface in c ---------- /*object*/typedef struct stream{int id;};/*method*/void StreamPlay(int id,intspeed);void StreamStop(int id); ---------- interface.xml the same object in xml using ruels of interface.dtd ---------- <object>Stream <method>Play<parameter type="int"> id</parameter> <parametert ype="int"> speed </parameter>. </method> <method>Stop <parameter type="int">id</parameter> </method><object> ---------- call.dtd rules for describing a c function call in xml ---------- <! ELEMENT parameter. # PCDATA><!ATTLIST parameter. TypeCDATA #REQUIRED><! ELEMENT method (#PCDATA,(parameter)+)><!ELEMENT method (#PCDATA,(method)+)> -- ---------- controller.c example controller command in c ---------- ...StreamPlay(0x1ae,500);.. .---------- call.xml the same command in xml using call.dtd---------- <!-example to play a. stream--> <call> <object>stream</object> <method>Play</method> <parameter value="500">speed</parameter> </call> [0059]The example of interface definition INTERFACE.DTD used so that the explanatory note document of INTERFACE.XML of the explanatory note document of the available service mentioned above might be drawn up above, and CALL.DTD is shown. Said CALL.DTD definition includes the regulation set for generating a method call like XMLRPC (Remote Procedure Call) or a XMLRPC message, or a function call message. Said CALL.DTD definition explains the output interface of the controller service 14. It is a home network and INTERFACE.XML expresses available service on a home network, for example. Available service is a subset of whole service in CE field.

[0060]A user controls a tuner access device like satellite STB by an OTR (One-Touch-Record) outline. A user controls tuning using EPG (Electronic Program Guide) like a graphics user interface expression which shows a program list. OTR recording provides the service which includes selection of a future program from EPG so that it can record without accessing a VCR graphic user interface, in order that a user may program VCR for the recording by which time delay was carried out. OTR automates control of VCR. : (1) whose following is an illustration motion-control list of OPR.XML The selected program stream outputted to the network from StreamOpen= satellite STB for reproduction;OTR. ; (2) with this control local to an STB device StorageOpen= storage service opening; and (3) A StorageRecord= network is led and it is

recording command transmission to VCR.

---------- call.dtd rules for describing a c function call in xml ---------- <!ELEMENT parameter. # PCDATA><!ATTLIST parameter. valueCDATA #REQUIRED><!ELEMENT method (#PCDATA,(parameter)+)><!ELEMENT object (#PCDATA)><!ELEMENT call (object,method)> ---------- interface.dtd example for describing an object interface in xml ---------- <!ELEMENT parameter. #PCDATA><!ATTLIST parameter valueCDATA #REQUIRED><!ELEMENT method (#PCDATA,(parameter)+)><!ELEMENT object (#PCDATA,method+)> ---------- interface.xml this document describes various CE services offered-a subset of the whole CE space.

---------- <?xml version="1.0"?> -- < -- !. DOCTYPE interface SYSTEM "interface.dtd" ><object>Stream <method>Open <parameter. type="int" >id </parameter>. <parameter type="int"> channel</parameter> </method> <method>Close<parameter type="int"> id </parameter>. < -- /-- method -- > -- < -- /-- object -- > -- < -- object>Control -- < -- method>Set -- < -- parameter type -- = -- " -- int -- " -- > -- id -- < -- /-- parameter -- > -- < -- parameter type -- = -- " -- int -- " -- > -- level -- < -- /-- parameter. >. < -- /-- method -- > -- < -- /-- object -- > -- < -- object>Storage -- < -- method>Open -- < -- parameter type -- = -- " -- int -- " -- > -- id -- < -- /-- parameter -- > -- < -- parameter type -- = -- " -- int -- " -- > -- channel -- < -- /-- parameter. > </method> <method>R. ecord /[<parameter type="int"> id<] parameter> </method> <method>Play <parameter type="int"> id </parameter>. <parameter type="int"> speed</parameter> </method> <method>Stop <parameter type="int"> id </parameter> </method>. <method>Close <parameter. type="int" >id </parameter>. < -- /-- method -- > -- < -- /-- object -- > -- < -- object>Display<method>Open -- < -- parameter type -- = -- " -- int -- " -- > -- id -- < -- /-- parameter -- > -- < -- parameter type -- = -- " -- int -- " -- > -- channel -- < -- /-- parameter. > -- < -- /-- method -- > -- < -- method>Render -- < -- parameter type -- = -- " -- int -- " -- > -- id -- < -- /-- parameter -- > -- < -- /-- method -- > -- < -- method>Blank -- < -- parameter type -- = -- " -- int -- " -- > -- id. </parameter> </method>. <method>Control <parameter. type="int" >id </parameter>. < -- parameter type -- = -- " -- int -- " -- > -- cid -- < -- /-- parameter -- > -- < -- parameter type -- = -- " -- int -- " -- > -- level -- < -- /-- parameter -- > -- < -- /-- method -- > -- < -- method>Close. <parameter type="int">id</parameter> </method></object><! ---------- otr.xml. an xml representation. of one touch record. c . representation:. StreamOpen(100,2);/*play a stream(pushed by satellite feed*/ StorageOpen(24,2);/*open a storage service*/ StorageRecord(24 ; /*record the stream*/ ---------- <?xml version="1.0"?>. <!DOCTYPE interface. SYSTEM"call.dtd"> <call>. <object>stream </object>. <method>open </method>. <parameter value="100"> id<channel

[/parameter> <parameter value="2">] </parameter> </call> <call> <object>storage </object>. <method>open </method>. <parameter value="100"> id<channel[/parameter> <parameter value="2">] </parameter> </call> <call> <object>storage </object>. <method>Record</method> <parametervalue="100">id</parameter> </call> [0061]As it argued about drawing 15 in the top, the 1st device B accesses the INTERFACE. XML document of the 2nd device A, in order to investigate the details matter of the device performance of A, and an API interface, and can determine the function in which the 2nd device A was supported, and a command item. Specially, said 1st device B can determine overlapping supported by the 1st device B and the 2nd device A, and the method of following and using. Drawing 16 shows the example which accesses the INTERFACE-A. XML document of the 2nd server device A with which the 1st server device B containing the application B contains the application A. Said 1st server device B contains INTERFACE-B.XML for the 2nd server device A to compare with an INTERFACE-A. XML document.

[0062]Said 1st server device B tends to control the 2nd server device A by one scenario in a network. The INTERFACE-A. XML document of said 2nd device A is transmitted to the 1st server device B from the 2nd server device A, and is used by the application B which asks the performance and the API interfacing method of the 2nd server device A. This permits that the 1st server device B controls the 2nd server device A using XML remote procedure call XMLRPC. In other scenarios, after said 1st server device B tries the 2nd server device A and communication once [at least] and communication confirmation fails in it, it performs the above-mentioned stage. In other scenarios, said 1st server device B is distantly asked to INTERFACE-A.XML in the 2nd server device A, without transmitting an INTERFACE-A. XML document to the 1st server device B.

[0063]In investigating the item of an INTERFACE-A. XML document, said 1st server device B can create the command for transmitting to the 2nd server device A in an XML format, as mentioned above. Generally, as said 1st server device B was mentioned above, even if [a part of] it has little INTERFACE-A.XML overlapped by the XCE definition subset used by the 1st and 2nd server devices B and A, it can interpret an item. Supposing said 1st server device B cannot interpret the partial item of an INTERFACE-A. XML document, the 1st server device B can disregard the portion, or can fetch the application assisted so that it may explain by translation that it is later mentioned by the portion.

[0064]If drawing 17 is referred to, other examples which control the device device or internal device between the controller server device 14 and the controlled server device 14 are shown. Said controller device 14 contains the application C which can perform the controlled device 14 including controller application. The controlled device 14 includes application interface explanation of INTERFACE-A.XML and the application C further. The application E accesses the application interface explanation A in the device 14 controlled in order to ask the

performance of the device 14 and the controlled API interfacing method of the server device 14 which were controlled. Next, the application E orders and controls the application C using an XML remote procedure call, in order to control the controlled hardware of the device 14 or the service D. A scheduler device may be the 1 case of the controller device 14 which will be driven if the day set like the time-delay-recording control machine of VCR comes.

[0065]By the 1st example, said application E accesses the application interface explanation A by remote reference which led the network. By the 2nd example, said application E accesses the application interface explanation A by transmitting the copy of the application interface explanation A to the controller device 14 from the controlled device 14. Next, the application E is locally asked to the interface explanation A. It is transmitted to the library device 64 which the application interface explanation A provides with library space by the 3rd example for interface explanation, and the application E asks the interface explanation A distantly in a library. Said library device 64 stores the address (URL) of the related application which can use a direct control action and response.

[0066]If drawing 18 is referred to, an XML protocol provides a web standard common middleware hierarchy in the communications stack 66 on the API level between the applications 20 of the various devices 14 with a network. The topmost part application of a communications stack transmits and receives a communication message through a network with each device 14, and it communicates with a software hierarchy by the device stack which controls locally the device hardware or service software for a device.

[0067]It is used in order that 1st XML layer API designed by XML layer OUT 68 may transmit a message, and 2nd XML layer API designed by XML layer IN 70 is used in order to receive a message. Document type definition CALL.DTD by which XML-defined, namely, the XCE definition and the method call were mentioned above is used so that XML layer OUT 68 may be generated. Document type definition INTERFACE.DTD by which XML-defined, namely, it was furthermore mentioned above for the XCE definition and the method call is used so that XML layer IN 70 may be generated. For example, controller application uses XML layer OUT 68, and uses application ENXML layer IN 70 controlled.

[0068]If drawing 19 is referred to, the embodiment of further others of a server device server device command and control structure is shown. XML-base control structure is used for the device driven by a web and the Internet, or the device device (service pair-service) for service. The 1st device A can control the application 20 by the 2nd device B distantly through the network which uses an XML command message. The interface to each device is described by XML format including the interface to application within said device. Said interface is extended on a middleware hierarchy through a network for the correction and explanation by other devices, and can become usable so that it may be mentioned later.

[0069]Each server device A and B includes the hardware and software for controlling other

server devices through a network and being controlled by other server devices through a network. In drawing 19, the home network device A is a controller device or a module, and the home network device B is the controlled device or module. Each device A and B includes the local device XML interface 72 which comprised interface document INTERFACE.XML and document type definition INTERFACE.DTD. An INTERFACE. XML document includes explanation of the object supported by the corresponding device 14, a method, and a parameter. Said INTERFACE.DTD document is used with the XML interface of a device for a concrete justification check, as mentioned above.

[0070]Each device A and B contains XML parser (Parser)74 which comprised a program code for carrying out parsing of an XML message like [again] an XML interface and a XMLRPC command, and checking it. Said XML parser 74 is similar to said XML hierarchy IN 70 mentioned above about drawing 18. Each device A and B, In order to reproduce the method name and parameter of XMLRPC, the XMLRPC decoder for carrying out decoding of the XMLRPC encoder and the XMLRPC message inputted for carrying out encoding of the method name and parameter which are sent out from a XMLRPC message is included. The XMLRPC codec 76 becomes independent of the device XML interface 72 and device device control structure, and use of a XMLRPC format is permitted, without changing other features of device device control structure from it.

[0071]Interface Fetscher (Fetcher) who comprised a program code, It is used by each device A and B in order to fetch the device interface of the device of direct further others from the device or the home network interface library 80 of further others. If the device 14 is a controller device, the controller application program code 82 in the controller device 14, A command and control of other devices 14 are affected through a network by controlling the software and hardware in the controller device 14 like XML parser 74, interface Fetscher 78, and the XMLRPC codec 76. If it is the device by which the device 14 was controlled, the controlled application program code 84 in the controlled device 14 will control the software and hardware in the device 14 for the device 14 controlled by other devices 14. The home network device web server 86 in each device A and B manages communication between the devices on a network. XML to the peculiar look-up table 88 in each devices A and B X, It is used by the controlled application 84 which changes a MLRPC message (for example, a method name, a component name, and a type) into the peculiar interface (for example, the peculiar method name, a component, and a type) of a device. Within an XML message, said table 88 is not used, when the peculiar interface of a device is the same as the name of a method and a parameter.

[0072]As for each device A and B, each hair drier 90 contains the pointer to the peculiar embodiment of a specified device function from application 84 controlled inside, including one or more hair drier (Handler)90 further. The peculiar embodiment of a device function contains the binary code in execution time with most devices. Binary code is generated by compile

duration from a high level language including C and Java. Therefore, the electric appliance manufacturer can add the hair drier 90 which was superior to that for a new function without affecting the existing hair drier and functional embodiment. The hardware service 92 includes the peculiar embodiment of a device function with each device A and B. Each device A and B includes the peculiar interface 94 which possesses API by the peculiar embodiment of a device function again.

[0073]Furthermore, The request broker for a home network (HNORB: .) Home Network Object Request Broker79 and a request broker for a network like an interface library (IL: Interface Library) provide the middleware hierarchy 98 for the home network 10. As shown in drawing 19, said middleware hierarchy 98 can be located in the 3rd device 96 or the separated control hub. Said HNORB79 contains the software agent for being used by the one device 14 which finds existence of other devices 14 connected to the network 10. Said HNORB software agent organizes a device name by the hierarchical tree structure of a name, organizes a device interface in said interface library which can be searched, and provides with a device interface the device which demands interface information.

[0074]The middleware hierarchy who comprised HNORB79 and IL80 is directly connected with the Internet like the selected home device accessed from the specified outside of the local home network 10. The middleware hierarchy 98 in one local home network is connected to the middleware hierarchy 98 by other local home networks through the Internet, in order to provide the network provided with the two home networks 10 integrated. In such a case, the attested user who has suitable stream coding can access a user's 1st domestic DVD changer (Changer) from a user's 2nd domestic TV, in order to play video and to watch it by TV.

[0075]In order to use said interface library 80, at least one HNORB&IL should be working on the local home network 10. One or more HNORB&ILs are used again. For example, all of a cable modem, some DTV, and a central home hub can have a HNORB&IL software agent of these very thing. In order to define the position of HNORB&IL, the device 14 transmits a broadcast massage through a local home network. 1st HNORB&IL which answered with the device 14 is used by the device 14. If HNORB&IL is located once, the device 14 and HNORB&IL will register, Device lookup service can be checked between [TCP (Transmission Control Protocol) or UDP (User Datagram Protocol)] the points for an interface request and fetch. If an UDP protocol cannot be used, it is used for high bandwidth width connection [like IEEE1394] whose TCP protocol is. XMLRPC of a HTTP-base is used for the device for HNORB&IL communication. For example, in order that the device 14 may pass a device interface as one or more components, the "register" method of HNORB can be called distantly, Or the XMLRPC call can reproduce a partial or overall device interface from IL as a value which XMLRPC-answers or returns.

[0076]As mentioned above, one or more HNORB&ILs can operate by the local home network

10 simultaneously, Each HNORB&IL can recognize the subset of an usable device here, and one HNORB&IL can communicate with other HNORB&ILs in order to locate the device 14 which is not found. Multiplex HNORB&IL on the one local home network 10 can be automatically located mutually by using a broadcast massage like UDP and TCP. In such a case, multiplex HNORB&IL constitutes the request broker for distribution, while many interface libraries 80 constitute a distributed interface library. In order to provide a fault-tolerant error, supposing one HNORB&IL must finish suddenly, all the devices registered with this HNORB&IL will be notified, and said device will be automatically registered with other useful HNORB&IL.

[0077]Each device interface has a single logical name on the consistent target put together. The position of said device, or also after a network address actually changes, a single logical name can be used for other devices on said consistent target which recognizes a device and accesses it. Mapping of a device address is actually treated by HNORB with mapping of a logical name by the software agent for naming service. Desirably, the standardized naming method is used. More desirably, in order to operate a device name by a hierarchical tree structure, a hierarchical naming structure is used. This hierarchical structure can be expressed to a file system and resemblance using "/." Although the structure is based on other positions like other service types like a home / MPEG 2/TV, or a home / sitting room / VCR, it is generated by other methods like. Various naming trees can live together for execution and efficiency.

[0078]In the command between the controller server device A in drawing 19, and the controller server device B, and the example of control, said middleware hierarchy 98 is in the 3rd device 96, or may be in the separated center hub. A dark block shows the device configuration element used for the special command shown in drawing 19, and the control processor. After the devices A and B become usable through a network and become accessible by an operation scenario, as for each device, the XML interface of itself and that is written in / submitted at the center HNORB and the IL middleware layer 98. If the center HNORB and IL middleware hierarchy cannot use it, each device broadcasts a message through a local home network, in order to tell itself.

[0079]The controller application 82 of said device A tries an inquiry to the controlled whole device B or the device interface of a portion. If the interface library 80 is not useful, the controller device A by transmitting a request to the device B first through a network, and receiving the XML interface of the device B to the device B, In quest of the device interface of the device B controlled directly, it can fetch from the controller device B. However, if the interface library 80 can be used, the controller device A can search for the whole device B controlled from the interface library 80, or the device interface of a portion. The software agent of HNORB acquires the XML device interface of said device B from the interface library 80,

and forwards it to the controller device A.

[0080]If the XML device interface of the device B by which the controller device A was controlled once is received, the controller application of the device A will use XML parser 74 of the device A, in order to analyze and translate the device interface of the device B. And the XMLRPC codec 76 of the device A generates a desirable XMLRPC command message using a parsing result. Said XMLRPC command message is transmitted to the device B controlled through the network. If said XMLRPC command message is received, the application 84 by which the device B was controlled will use XML parser 74 of the device B, in order to analyze and translate the received XML command message. And the XMLRPC codec 76 of the device B carries out decoding of the parsing result, in order to acquire method calling information from the command message which contains the method name and parameter for a device B function in order to offer called-for service.

[0081]Since peculiar functional execution of the device B is accessed and is sent out through the peculiar interface of the device B next, XML is used for the application 84 by which the device B was controlled to the peculiar look-up table 88 and the hair drier 90 with the device B. If the response with a function or the returning value is generated, encoding of said response or the returning value will be carried out to XML or a XMLRPC message, and it will be transmitted to the controller device A. The middleware hierarchies HNORB and IL provide for the device A by which the reference to the controlled device B was controlled, and the device A generates the remote call to a device B peculiar function like the call to a local device A peculiar function here.

[0082]Desirably, a standard XMLRPC format is used so that all the devices may explain a RPC call and decoding of them can be carried out through a network. In order to raise efficiency desirably [since the device interface of the controlled device 14 is asked by the controller device 14 and investigated], the simplified XMLRPC format which has sufficient device interface information is used. The following example shows two possible formats which call XMLRPC for OTR (One Touch Record) and TDR (Time Delayed Record) operation.

[0083]Example I:XMLRPC calls, A detailed tag and interface information. Example of a format to include: The example of a 1.OTR call :. [<?xml] version="1.0"?> <call>. <record [object>DVCR1.] </object> <method>timeDelayedRecord</method> <parameter> <parameter> <name>channel </name>. </int> <value<int>>4</value>. </parameter> <parameter>. <name>recordTime </name>. Example of <value> <time>2:10:30</time> </value> </parameter> </parameters> </call> 2.TDR call: <?xmlversion="1.0"?>. <call> <record [object>DVCR1.] </object> <method>timeDelayedRecord</method> <parameter> <name>channel </name>. <value> <channelName>NBC </channelName> -- <. /value> </parameter>. <parameter> <name>startTime</name> <value> <datetime.iso8601> 19990401T19:05:35< /datetime.iso8601 </value>>. </parameter> <parameter>

<name>recordTime</name> <value><time>2:00:00</time></value> </parameter> </parameters> </call> [0084]Example II:XMLRPC calls, The tag and interface information which decreased. Example of a format which it has: The example of a 1.OTR call :. [<?xml] version="1.0"?> <call>. <object>DVCR1.record</object> <method>timeDelayedRecord</method> <parameter value="4"> channel </parameter>. <parameter. value="2:10:30":[example of >recordTime</parameter> </call> 2.TDR call] <? xml version="1.0"?> <call> <object>DVCR1.record </object>. <method>oneTouchRecord</method> <parameter value="NBC"> channel </parameter> <prametervalue="1990401T19:. 05:35">startTime</parameter> <parameter value="2:00:00">recordTime</parameter> </call> [0085]If drawing 20 is referred to, the device interface for the home device 14 is based on the database 100 which uses the standardized term and which was formed into industrial standard structure. The interface data and the term for a new interface are added to the database 100. In order to explain CE object, a comprehensive definition or database, method, and parameter which use an English word are specified in the CE database 102. A comprehensive definition or database can become C and XML which show an object, the method of each of them, and a component, or other formats. The comprehensive definition or database which uses the standardized XML term is called a XCE definition or the database 104.

[0086]A controller and the controlled applications 82 and 84 are programmed using the standard interface subset of XML based on the XCE database 104. Each device interface is stored with said applications 82 and 84 with an XML gestalt. Even if said XCE database 104 does not need to be in XML, as mentioned above about drawing 15, said subset interface created by compile time by the embodiment of this invention will be in XML.

[0087]The information designed as 'manufacturing-company' information by drawing 20 for the embedded device 14 is built in the device 14 at the time of manufacture, and the information designed as a 'home network' is a part of-like execution time feature of a device of operation in a network. 1 for N device .... The device XML interfaces 72 designed as N are some data in the standardized XCE database 104. The home network interface library (HNIL: Home Network Interface Library) 106 provides a device interface set of the usable device 14 connected to the home network. HNIL 106 is a subset of the whole XCE database 104.

[0088]By drawing 16, a device interface is transmitted to the device B from the device A for the application B in the device B which investigates the contents of the interface for the device A. As mentioned above, a device interface is mentioned as INTERFACE-A.XML to the device A, including explanation of the object maintained by a device, and a method parameter. The device XML interface 72 is a device interface of an XML format. The contents of the XCE database 104 are the structure of a service base of providing a device interface.

[0089]If drawing 20 is referred to, said XCE database 104, The XCE interface document type

definition (DTD: Document Type Definition) by which it was standardized for CE device which provides the regulation set standardized in order to use XML expressing the CE device 14 is provided. Said DTD or its subset is used for a justification check. Although the software agent designed as the manufacturing-company means 108 filters and uses the subset of the XCE definition by which it was standardized for specified CE device, For example, standardized XCE interface DTD which generates the XML device interface 72 of a CE device like INTERFACE.XML and INTERFACE.DTD is used. Said document INTERFACE.XML includes explanation of the object supported by a special device according to standardized XCE interface DTD, a method, and a parameter. Said document INTERFACE.DTD is a subset of standardized XCE interface DTD, and is used for the justification check for the XML interface of a device. It is used in order that other document type definitions may generate an INTERFACE. XML document.

[0090]The XML interface 72 of CE device containing said XML interface document and said DTD document is stored in a library like the home network interface library 106 which can generally be accessed. The software agent 110 collects the device interfaces 72 of all the devices 14 on a network which can be accessed, and arranges them to the structurized interface library 106 which can be searched with a device name/address information. Said interface library 106 is a subset of the XCE database 104, and the process in which the interface library 106 is made is similar to reconstructing a portion or all the XCE databases 104. Said interface library 106, It can function as the cash (Cache) for which it depends on the usefulness of all the devices 14 by the home network in which a set of the device interface of all the devices in a home network or the device interface 72 most used for these days is stored. When the device 14 originates in an event like changing a disk with a DVD regenerator and updates the device interface 72, some device interfaces 72 are updated based on event service.

[0091]If drawing 21 is referred to, it has a desirable gestalt with the hierarchical device interface definition 72 of each device 14. This is because the device interface definition 72 may become long in a home device. The function of one or a small number typically like the single function for the recording by which time delay was carried out is accessed simultaneously, therefore a small portion is used for only [of said device interface 72]. It is more effective than creating the whole device interface 72 to create some device interfaces 72. By using a hierarchical device XML interface, the controller device 14, By specifying a desirable functional category or function in the demand for an XML device interface from the controller device 14 or HNORB, and IL middleware hierarchy 98, the partial device interface 72 of the controlled device 14 can be searched for. In the case of the latter, HNORB and IL middleware hierarchy 98 forward the desirable portion of the device interface 72.

[0092]If drawing 21 is referred to, said hierarchical device interface structure, (1) Now a useful

device. The 1st hierarchy 112 for the written-in XML interface of each home network, and (2) The 2nd hierarchy 114 for the general XML interface of each device which wrote in the functional category, and (3) The XML interface of each functional category for a device. The 3rd hierarchy 116 for specifying, and (4) Four layers including the 4th hierarchy 118 for standardizing the XML interface of each function in a functional category are included. Inside a home network, the three lower layers 114, 116, and 118 are merely used, and 112 [layer / 1st] is used in the home network exterior.

[0093]Drawing 22 shows said layers 112, 114, 116, and 118 and the corresponding example of an interface. The interface in each hierarchy is linked to a higher rank or a lower layer through the X link which provides a both-directions link, or a link like X pointer (if it can do). An X link is (1). The X link ingredient and (2) which make the link in an XML document recognize as a link The package of the hyper-linking functionality which has two parts of X pointer ingredient which carries out addressing of the link to the exact subpart of an XML document is included. Therefore, although an X link manages how a link is inserted in an XML document, said link shows data like a GIF file here. Furthermore, even from where, X pointer determines the fragment identifier (Fragment Identifier) which can go to URL, when linked to an XML document (from an HTML file).

[0094]With the typical command and control model for the server device 14 which controls other server devices 14 concerning this invention, the 1st device 14 is tried so that the device interface of the 2nd device 14 may be asked on the 2nd interface hierarchy 114. After choosing a functional category (FC: Function Category), said 1st device 14 asks the interface hierarchy 116 of a specific functional category with the 2nd device 14 like a recording category. Said 1st device 14 asks the interface hierarchy 118 a specific function like OTR or TDR, in order to make the call to said function. As a hierarchical or interface function with a more effective tree structure is looked for, network band width is contracted. It is as interface file structure and the example of a layer being the following.

4th layer of 3rd layer of 2nd layer of 1st layer 112-HN1.xmlXML114-VCR1.xml116-VCR1_RecordCategory.xml118-VCR1_RecordCategory_OTR.xml [0095]Similar, the home network interface library 106 is hierarchical, and can be structurized by various methods by other service types of a device, or other positions like a room. Said hierarchical structure is an interface of other home networks or the local home network 10 to the Internet.

[0096]The hierarchical device interface definition 72 is shown below by the illustration target embodied by the XML syntax (Syntax).

consumer (document_file, doc). + ---- document_file<server_home.dtd and server_auto.dtd>+ ---- doc () [services_home, server_auto, server_samsung_web_site and] avc_commands and cal_commands, + ----services_home

(xml_utility,client,server_av,lighting,comms,hvac,utility,security,appliances,convenience, + ----

xml_utility. (download_DTD_file). + ---- client (acknowledge, attention, error, post_message, sound, stop_schedule, stop_all)+---- sound (alarm, ring, buzz). + ---- server_av (controls_gen, source, sink)+ ---- controls_gen (p ping) rocess_infor and setup, + ---- process_info (second/w_id, h/w_id)+ ---- h/w_id (ser_no, manuf, model, class)+ ---- s/w_id (ser_no, exe_name, version). + ---- setup (clock). + ---- clock. (hours, minutes, seconds). + ---- source. (service_id, media, rate, protocol, stream_format, controls_av)+ ---- sink () [service_id, media rate, protocol, stream_format and] controls_av, + ---- service_id (url)+ ---- media (tpt_stream, ram, disk, tape)+ ---- disk (name, number). + ---- rate<value>+ ---- protocol (61883/1394, UDP/IP/Ethernet)+ ---- 61883/1394 (isoch_.) ch_no + ---- stream_format () [video and] audio, + ---- video. (dv, mpeg2tpt, dsstpt, mpeg2pes, mpeg10801-tpt)+ ---- audio (mpeg3, ac-3, midi) +controls_av () [flow_control, tune timer_record and] ui_control, + ---- timer_record (tune, flow_control)+ ---- flow control (play, stop, goto, record)+ ---- play (time_params). + ---- record (time_params). ---- + time_params (now, start, duration, end)+ ---- tune (send_epg, channel)+ ---- channel (number, id, time_params). + ---- ui_control (display, acoustic)+ ---- display (brightness, contrast, color/tint, horiz_size, vert_size)+ ---- ac. oustic (volumn, base, treble, balance, fade)+ ---- lighting (sensors, lights, send_epg)+ ---- sensors (living_room, sky). + ---- lights (rooms_up, rooms_down, yard)+ ---- rooms_up (bed1, bed2, bed3, bed4)+ ---- bed1 (lamp, dimmer). rooms_down (family, kitchen, living, dining, soho, garage)+ --- + dimmer<value>+ ----. -----. yard (front, back)+ ---- comms (homehub, intercom, telco)+ ---- homehub (send_device_list, send_configuration, sene_snmp_mib). controls_ ---- + intercom()+ ---- telco()+ ---- hvac (controls_gen, controls_havc)+ ----. hvac. (a/c, heat, temp, humidity). + ---- temp (low, high, hysteresis)+ ---- utility (meters, energy_mgmt)+ ---- meters (water, gas, electric). + ---- water<value>, gas<value>, and electric<value>+ ---- security (sensors, send_epg, alarm)+ ---- sensors () [peripheral, motion and] + ---- peripheral. (rooms_up, rooms_down). + ---- motion. (room_down, yard) + ---- appliances (microwave, range, oven, fridge, freezer, coffee, toaster, washer, dryer, water_heater). + ---- microwave (send_epg, controls)+ ---- fridge (temp)+ ---- water_heater (temp)+ ---. - convenience (window, curtain_open, door/gate, pool/spa, bath, fountain, lift, jacuzzi)+----curtain_open<value>. + ---- server_auto (message, server_auto_ford_explorer_98)+----server_auto_ford_explorer_98 (mileage, maintenance). + ---- mileage<data>. + ---- maintenance<data>. + ---- server_samsung_web_site(message, service, help)+ ---- avc_commands -- < -- command_string and >+---- service_id (url). +cal_commands<,,,command_string,,,> +---- service_id(url,, [0097]Said hierarchical device interface definition 72 includes the following fields.

'document file' and this provide the name of the regulation (DTD) file of the document type used by the XML parser for verification of the justification of the version portion of the XCE database 104 or the XCE database 104, and correction. Being able to consider various DTD

files for the portion into which said XCE structure is different, said DTD differs from INTERFACE.DTD for the document type definition for RPC.CALL, and communication here.
'doc' and this provide compatibility, the characteristic, communication, and the highest level name of the field of a control interface.
'Services_home' and this provide the field for home automation, electric appliances, and use nature.
'Server_auto' and this show the useful message interface over one set or the automobile type beyond it to the car in a car barn. For example, 'server_auto_ford_explorer_98' is an interface to a specific car. This enables it to access the mileage and maintenance interface of a car, and the car manufactuing company or car barn checked directly is used by a direct check or the remote access which carries out the telediagnosis.
'server_samsung_web_site' and this communicate with the manufacturing-company website of the home exterior, and include the interface for a message, service, assistance, etc.
'AVC_commands' and 'CAL_commands', and this can interpret AV/C and a CAL language -- it succeeds -- a device is provided. This structure part checks a command in said language, and a command is added by XML or is performed. Therefore, as for said item, the protocol converter application for XCE (Web) is used as an interface to original CAL or AV/C application software.
[0098]As mentioned above, 'Services_home' provides the main structure containing A/V electric appliances. Said a part of structure is extended in detail to a video service sink and a stream destination (for example, DVCR) control interface as a specific example. : in which a control interface contains the next by a typical home network -- 'xml_utility'. This provides the details matter for supporting a support utility network function like carrying out downloading of the DTD file, interface file, and program file which were updated.
'client' and this explain the interface details matter of the client device 12 containing a web browser. For example, 'acknowledgment' displays attestation consent of a controller with the shipped message or command.
'server_av' and this provide control and a capacity interface to all the useful audios and video services containing STB, DVCR, DTV, DVD, AUDIO, etc.
'lighting' and this provide a home automation lighting control machine with an interface, and include a sensor, lighting, etc.
'comms' and this provide a communication device with a control interface, in order to restore the remote management or composition of the set rise of the purpose of use or a device, or a component typically.
'hvac' and this are used in order to provide the interface for remote control of a HVAC system, for example, to erase a domestic HVAC system during the peak load of the day and to control said system by a utility plant company (Utility company) from the home exterior. By the device

for the device based on the controller which provides a control mechanism still more complicated than automatic-temperature-adjustment device control, said interface may be used in order to control a HVAC system from the inside of a home.
'utility' and this provide the interface for reading the measuring instrument for a home.
'security' and this provide the interface for a security sensor and alarm setting. Therefore, interface use and the application advance can access the sensor and sensor around a home for the surveillance of the device, and control on a home network device.
'appliances' and this provide the interface for the kitchen and the useful and common home device which include other control and a component from remote control, temperature setting perception, or a controller device. In one scenario, the microwave oven can scan the bar code information on a cooking item package, and in order to know the cooking time of cooking to the given microwave oven system type, it can access a manufacturer database. Integration of the device which uses a device device command and control provides many control scenarios, in order to provide service like stopping a dishwasher automatically and carrying out mute (Muting) of the television, when a telephone call is answered in a kitchen or sitting room.
'convenience' and this provide the interface to a device, in order to provide expedient service like the interface to a curtain, a window, a blind, or a wash controller.
[0099]By the aforementioned explanation, to the A/V device which provides A/V service, 'server_av' is a part of structure for a control interface, and is divided into 'controls-gen', 'source', and 'sink' performance again.
'controls-gen' provides the interface for general utility interfacing like the ping (Ping) test which tests a device fabrication person attribute and device existence. Software, a hardware check, and a fabrication property like version information are included. The device which provides said interface returns the data which provides the name or check to said software without bringing about any control actions. The interface which sets the time of a day clock is included.

'sink' provides the interface for a media stream service device. The structure is the composition based on the service (for example, video stream recording and playback) provided rather than a special device name like VCR. For example, a tuner and a DVD player are video program stream sauce which has both of video program formats to a network, and are controlled like a start and a stop. The address of the difference in specific device control is done by the lower hierarchy of a structure definition.
'source' provides an interface similar to the 'sink' interface.
[0100]If the contents mentioned above are referred to, 'service_id' or 'application_interface_id' includes the URL position of a name, an address, a web address, or one or more devices. Since the XCE database 104 constitutes the whole on which it has agreed to an interface, Usually, a DHCP (Dynamic Host Configuration Protocol) software agent assigns an address

and a default name to each device, and said address and a default name are added to service or the interface of a device. And in order that the software agent 110 may generate 'a partial XCE network (Network partial XCE)', The device interfaces 72 which contain a subset or 'a partial XCE device (Device partial XCE)' from all the devices locally connected to the home network are collected. An additional related external interface is added to the structure for external control. For example, 'service_id' may be the name/address in the received structure which includes subscription from a software agent with the device interface of the device connected to the network, or the network interface library 106. Then, the user can search service with a database and can access the application which contains the specific data part of a library using said name/address. Therefore, the network can include the same multiplex service identified by said name/address information.

'media' and this provide the interface for the media type containing the disk and tape for the transmission stream from a tuner, RAM from PC DRAM, DC, or DVD. Said media are named and checked and the controller device can search the XCE database which checks the general media provided on a network. When new media like a DVD disk are provided on a network, some device interfaces 72 which check program data on a disk are changed into conformity. Therefore, the whole device interface 72 does not need to be transmitted and the portion for which it was merely suitable is transmitted to a XCE database. By reception of an attention signal, the library software agent 110 can fetch new updating, and is located in it by the place for which it was suitable. Addition of a disk medium is similar to adding service to said network or connecting other devices to said network.

'rate' and this provide the value to the data stream rate for a device interface like for example, 6 Mbits/Sec or 19.2 Mbits/Sec.

'protocol' and this check the protocol used for said data stream. For example, a desirable protocol will be chosen if 61883/1394 or U is provided with one or more protocols like /IP.

'stream_format' and this provide the packet format and/or compression standard for the Digital Stream audio and video division. If one or more formats are provided, a desirable format will be chosen through an interface message. The format which can determine whether the controller application 82 has an interexchangeable format can be investigated.

'controls_av' and this provide the main control interface for an A/V media device.

'Flow_control' and this are the methods for a specific device, and provide data stream control like PLAY, STOP, GOTO, and RECORD. The method does not change to the device (Embedded) embedded, for example except for PC software. The tkdrl control can include a time component for the delayed operation.

'Tuning' and this provide the interface for tuning control. The controller device 14 can ask for the reply of the electronic program guide (EPG: Electronic Program Guide) data structure mentioned above by the interface of the controlled device 14.

'UIcontrol' and this provide with a control interface the application 84 controlled in order to control correction like the volume to the luminosity and the contrast, and the audio to a display, and a base.

'Timer_record' and this provide the interface for a set updater to the controller application 82, in order to embody the delayed time record. Direct channel alignment information and flow control (time_aparams) information are used.

[0101]The aforementioned explanation is identically applicable to the client device 12. Other syntax XCE definitions for CE field or a database is used. An alternative plan syntax XCE database includes all the service explanation which includes home automation, a device, and a car, for example. When it provides adaptability and a parameter for control of a service object, the control method is used in order to control said object as hope. The example of a command is shown below with AV/C and the CAL instruction word containing a binary number or a hexadecimal number data row.

consumer (document_file, doc). + ---- document_file<server_home.dtd and server_auto.dtd>+---doc(avec_commands,cal_commands,services_home,server_auto,)server_ auto, server_samsung_web_site, server_auto_ford_explorer_98, and +---- avc_commands<...command_string...>. + ---- call_commands -- < ... command_string ... >+ ---- services_home () [client, av, lighting, comms, hvac, utility, security, appliance and] convenience, + ---- xml_utility (download_DTD_files)+ ---- client (acknowledge, attention, error, post_schedule, and soundstop_schedule -- st.) op_all, + ---- sound. (alarm, ring, buzz). + ---- server_av (source, sink). + ---- soruce. (service_id, media, rate, protocol, stream_format, controls_gen, controls_av) + ---- sink () [service_id, media rate, protocol and] stream_format and controls, + ---- service_id (url). + ---- media. (tpt_stream, ram, disk, tape). + ---- [+ ---- 61883/1394 (isoch_ch_no).] disk(name, number)+ ---- rate<value>+ ---- protocol (61883/1394, UDP/IP/Ethernet) + ---- stream_format (video, audio)+ ---- video (dv, mpeg2tpt, dsstpt, mpeg2pes, mepeg1080 i-tpt)+ ---- audio (mp.) eg3, ac-3, and midi, ---- + control_gen (ping, process_info, setup)+ ---- controls_av (flow_control, tune, timer_record, ui_control). + ---- process_info (second/w_id, h/w_id)+ ---- h/w_id (ser_no, manuf, model, class)+ ---- s/w_id (ser_no, exe_name, version). + ---- setup (clock). + ---- clock (hours, minutes, seconds)+ ---- time_record (tune, flow_control)+ ---- flow_control (play, stop, goto, record). + ---- play (time_params). ---- + record (time_params)+ ---- tune (send_epg, channel)+ ---- channel (number, id, time_params)+ ---- time_param. s (now, start, duration, end). ---- + ui_control (display, acoustic)+ ---- display (brightness, contrast, color/tint, horiz_size, vert_size). + ---- acoustic(volume, bass, treble, balance, fade)+ ---- lighting () [screen, light and] send_epg + ---- sensors (living_room, sky)+ ---- lights (rooms_up, rooms_down, yard)+ ---- rooms_up (bed1, bed2, bed3, bed4). ---- + rooms_down (family, kitchen, living, dining, soho, garage)+ ---- yard (front, back)+ ---- bed1 (lamp, dimmer). + ---- dimmer<value>+ ---- comms (netman, intercom,

telco)+ ---- netman (send_device_list, send_configuration, send_snmp_mib). + ---- intercom()+ ---- telco(). + ---- havc (controls_gen, controls_hvac)+ ---- controls_hvac (a/c, heat, temp, humidity)+ ---- temp (low, high, hysteresis). + ---- uti. lity (meters, energy_mgmt). + ---- meters (water, gas, electric)+ ---- water<value>, gas<value>, and electric<value>+ ---- security (sensors, send_epg, alram). + ---- sensors (peripheral, motion)+ ---- peripheral (rooms_up, rooms_down)+ ---- motion (rooms_up, yard). + ---- appliances. (microwave, range, over, fridge, freezer, coffee, toaster, washer, dryer, water-heater) + ---- microwave (send_epg, controls). + ---- fridge(temp)+ ---- water_heater (temp)+ ---- convenience () [window, curtain_open, door/gate, pool/spa bath, fountain, lift and]) +----curtain_open<value> +----server_auto (message,mileage,maintenance,,) +----mileage<data> +----maintenance<data> [0102]In other viewpoints, this invention provides use of the instruction word embodiment which exists in a network for a device device command and control. A device has API which generates a binary number sequence at the time of execution according to the existing transmission mechanism for an inside. In such a case, in order to provide the device 14 of further others with an XML remote procedure call (XMLRPC: XML Remote Procedure Calls) from the one device 14 in a network, The existing application interface embodiment is exchanged by the call to XML service API. Therefore, original embodiment is equivalent to the trumpet (Wrapper) for XML service API. Drawing 18 shows the application generated as interface embodiment exchanged by the trumpet by XCE/XML service API again using CAL in a dotted line, or other instruction words like AV/C. The example which changes a XMLRPC format from a CAL instruction word is shown below.

---------- existing implementation:void. DeviceCALCommand (int.) command{x. x /* create CAL formatted byte string to represent this object/method and output to the wire */ CreateCALFormattedByteStrin g (command); /* different forevery protocol*/ SendCALByteString(); */different for every protocol*/} ---------- ---------- wrapping the XML Service. API. call: void DeviceCALCommand(int command){{/* replace CAL implementation with calls to the XMLServiceAPI */ CreateXMLMessage(command; /* always the same */ sendXMLMessage (); /* always the same */} [0103]In the viewpoint of further others, if drawing 23 is referred to, this invention provides the standard instruction protocol for communication between devices between the devices of the others in a network, and control language translation. It should be the format as which said information can interpret a request device for other devices which share information. And in order that the one device 120 may control other devices 22, said two devices should use the common language, in order to interpret a mutual command. This invention provides the common discernment format for data, and a command protocol. [0104]By one embodiment, common display or data, and the method of carrying out a command protocol package are provided, and, thereby, the receiving device 122 can

determine the format of original of the transmitted data. Supposing a receiving device can interpret an original format, the direct reception of the data can be then carried out. Otherwise, the receiving device 122 can ask for the application which transforms data into the desirable format which can interpret the translation device 124 or the request device 122. Said translation device 124 or application transmits the data which determined the format of original of the original data, translated said data in said format searched for, and was translated into the request device 122.

[0105]Next, said request device 122 processes data, as said data was completely provided in the language format of original of a request device by the transmission device 120 from the first. Said request device 122 can transmit a response to the transmission device 120 by a proxy again through the application which sends a reply or is translated in the original format of the translation device 124 or the transmission device 120 in the format of original of a request device. Said translation method is used for the information containing a command protocol, a data file, and an audio/video stream.

[0106]For the device which does not use the compatible format mentioned above, this invention provides translation of the data which contains the command protocol from /to a hard (Non-compliant) device. For example, when the hard device 120 transmits data to the flexible device 122, said flexible device 122 can translate data based on the determination of an original format of said data. For example, said flexible device 122 can investigate the data for the specific bit pattern inside data. When a flexible device transmits data to a known hard device, before transmitting said flexible device based on the determination of an original format of a hard device, it can translate said data.

[0107]Illustration embodiment may be for the home network which supports IP and an HTTP protocol. Said home network is connected to the Internet in order to obtain the application for a desirable function, and service various type. Therefore, the compatible format method is made so that it may have the Internet Protocol and the procedure over operation, and compatibility on the Internet and a home network.

[0108]An example which provides a common data format is using XML which generates the data package for transmission through a home network. Said data contains a command protocol, an audio or a video stream, graphics, or application. Said data is wrapped by the standard header which checks the format of original of data, and the item of a package with an XML gestalt. Said header checks the data part of a data type and the XML code to only, said data is translated by it if needed and application suitable after reception is provided with it.

[0109]Under a web standard, said confirmation work is performed by the browser which uses file name extension, in order to check the type and item of file transmission. Next, a browser moves the module of a suitable plug which processes the file. By a home network, XML is used in order to check the data communications which provide all the home network

transmissions on IP by the common check method mentioned above.
[0110]The software hierarchy who, on the other hand, checks the item of all the data communications through a home network to only is provided by a home network protocol stack. Said software layer is used instead of XML. The compatible format and check principle of this invention are identically applied to said software hierarchy as the embodiment which uses XML, or the check method.
[0111]If data package transmission is received by drawing 23, the receiving device 122 will investigate the XML check header of the data package which determines the format of the data in it. If said data is the format which can be recognized with the device 122, XML check header information will be thrown away and said device will process data directly. Otherwise, said device 122 changes the received XML package into an XML translation request package, and transmits a request package and said data to the translation server device 124.
[0112]Said translation server device 124 translates said data, and changes said translated data into an XML translation response package. Next, said translation server 124 forwards a response package to the request device 122. In a translation error, said translation server 124 can provide a translation response error condition at the request device 122. If the translated data is received, said request device 122 will process the translated data with a response package.
[0113]the example of an XML data package or a packet is as follows : <IDENTITY type=format=AV/c> ... packet data ... the example of a </IDENTITY> translation request package or a packet is as follows. : . <TRANSLATION REQUEST. type=Command format=CAL>. <IDENTITY type=Command. format=AV/C> ... packet. A data </IDENTITY> </TRANSLATION REQUEST> translation request package or the example of a packet is as follows. : <TRANSLATION RESPONSE type=Command. format=CAL> ... packet. data </TRANSLATION RESPONSE>. The example of a transmission response error condition package or a packet is as follows. : <TRANSLATION RESPONSE type=Command format=CAL> ... packet data ... <ERROR. condition=Unrecognized command>Transla. tion could not be performed</ERROR> </TRANSLATION RESPONXE> [0114]The table 3 includes a package or a packet type, and the partial list of formats by drawing 24.
[0115]In order to provide translation service, the translation server 124 is checked in a network between network composition by a method similar to the method of a DHCP server. Said translation server 124 broadcasts the IP address to all the devices in the back fixed time network with which the network was constituted. Translation service and all the devices 120 and 122 which can carry out compatibility store the IP address of the translation server 124 broadcast through a network, while carrying out booting of the network.
[0116]On the other hand, the request device 122 can broadcast a translation request through a home network. All the translation servers 124 which receive a translation request in a network

can answer a translation request by transmitting a translation response to the request device 122. Next, the request device 122 chooses the one translation server 124 in a response translation server. As an example, the request device 122 chooses the first translation server 124 that answers a translation request. In other examples, for selection of the translation server 124 which fills a translation request, the translation server 124 is between them the very thing, and it can be negotiated for it with/or the request device 122.

[0117]By the embodiment of further others of this invention, in order that the multiplex translation server 124 may perform all the translation requests, it is used. For example, the single translation server 124 may not have the performance which translates all the requests. In this case, it is necessary to check the type of the translation service which can provide the address of each translation server, and each translation server. Each devices 120 and 122 can store all the translation server IP address lists, the list which ****s in the translation service type which each translation server 124 provides, and the selectively related translation application.

[0118]If you wish to transmit data to the receiving device 122 known as the transmission device 120 uses a format originally different from transmission device 120 format for efficiency, Said transmission device 120 can transmit data to the receiving device 122 by the proxy which led the translation server 124. Said transmission device 120 includes the address of the receiving device 122 as a destination to the data which transmitted the command to the translation server 124 and was translated into a transmission request command and resemblance at the translation server 124.

[0119]When the receiving device 122 requires translation of a data stream, the transmission device 120 can carry out routing of the data stream to the direct translation server 124, and said translation server 124 transmits the data translated into the receiving device 122 as it was mentioned above one by one. In other one side, said transmission device 120 can transmit a data stream to said receiving device 122, and next, in order that the receiving device 122 may forward the data translated into translation and said receiving device 122, it carries out routing of the data stream to the translation server 124.

[0120]It is under explanation, and a control mechanism is distributed and is based on HTTP1.1 which provides the application level protocol for a cooperative hypermedia information system. In the broad use for many tasks, HTTP is common and is a protocol of a for [state / (stateless) / non-/ objects]. The feature of HTTP is a classification and negotiation of the transmitted data and the data representation which a system comprises independently. Desirably, the network protocol used by a device and application on the home network is IP (Internet Protocol). However, other protocols are used.

[0121]Other modification is possible although this invention was explained in detail by the desirable embodiment. Therefore, a claim must not be limited by the desirable embodiment of

this invention.

[Brief Description of the Drawings]

[Drawing 1]It is a block diagram for the embodiment of the network concerning the 1st viewpoint of this invention.

[Drawing 2]It is a block diagram of drawing 1 concerning a 1st embodiment of device control and outline corresponding.

[Drawing 3]It is a block diagram showing a 1st embodiment to the home network system concerning this invention containing many clients and server devices.

[Drawing 4]It is a block diagram showing the client device of drawing 3, and a 1st embodiment of server device embodiment.

[Drawing 5]It is a drawing in which a 1st embodiment of client device embodiment is shown.

[Drawing 6]It is a drawing in which a 1st embodiment of server device embodiment is shown.

[Drawing 7]It is a block diagram showing mutually a 2nd embodiment of the network server device which enables communication and control.

[Drawing 8]It is a block diagram showing a 1st embodiment to the structure of the audio / video model which contains a sauce server device, a sink server device, and a client device in a network.

[Drawing 9]It is a drawing in which other embodiments of an audio / video model are shown.

[Drawing 10]It is a drawing in which the embodiment of the performance data table for a network device is shown.

[Drawing 11]Drawing 11 is a drawing in which the embodiment of the characteristic data table for a network device is shown.

[Drawing 12]It is a drawing in which the composition of a 1st embodiment to the building block which generates a command message between network devices is shown.

[Drawing 13]It is a drawing in which the composition of other embodiments of the building block concerning drawing 12 which generates a command message is shown.

[Drawing 14]It is a drawing in which a 3rd embodiment of an interaction is shown between a network client and a server device.

[Drawing 15]It is a block diagram of a 1st embodiment that defines API extension of a network device interface.

[Drawing 16]It is a drawing in which the structure of a 1st embodiment for the server device application which accesses the interface explanatory note document of other server devices is shown.

[Drawing 17]It is a drawing in which other embodiments of the internal-device control structure between a controller server device and the controlled server device are shown.

[Drawing 18]It is a drawing in which the embodiment of an XML protocol which provides a web standard common middleware hierarchy by a communications stack on the API level between

network devices is shown.
[Drawing 19]It is a drawing in which other embodiment of the instruction control structure between server devices again is shown.
[Drawing 20]It is a drawing in which the relation between a device interface library and the electric appliance database for a home device is shown.
[Drawing 21]It is a drawing in which the embodiment of a hierarchical gestalt to a device interface definition is shown.
[Drawing 22]It is a drawing in which a hierarchy's 1st embodiment is shown by the device interface definition of drawing 21.
[Drawing 23]It is a drawing in which common transmission and an interpretation procedure are shown between a transmitter and a receiver device.
[Drawing 24]It is a drawing in which the packet type for providing the translation service concerning the 1st viewpoint of this invention and a 1st embodiment of the partial list table of a format are shown.
[Description of Notations]
10 Network 12 The client device 14. The server device 16 communication-link 18GUI display 20. Server control program 22 graphic controlled object (GCO) user interface description 24 client-device renderer 26 control-state-data 28 clock 30 instruction-word interface 32 The data stream sauce hardware 34. The data stream sink hardware 36. Session management person 40 The functional standard block 42 of service. The block 44 with which a message element is constituted. Industrial standardization format block 46 message compressed block 48 message-character-string configuration block 50 Software client control programs 52, 54, 58, and 60 Blocks 56 and 62 The look rise table 64. The library device 66 communications stack 68. Request broker 80 for XML layer OUT70 XML layer IN72 XML interface 74 XML-parser 76 XMLRPC codec 78 interface Fetscher 79 home network The home network interface library 82. the controller application program code 84 -- an application -- KESHI. the YOMPU log rum code 86 home-network device web server 88 -- peculiar -- the look-up table 90 hair-drier 92 hardware service 94 -- the peculiar interface 96 -- the 3rd device 98 -- middleware hierarchy 100. Database 102 CE database 104 XCE database 106 home-network interface library 108 manufacturing-company means 112,114,116,118 hierarchy 120 transmission-device 122 request device 124 Translation device

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention]
This invention relates to the network system field, and it is related with the home network which possesses more two or more devices connected with it in details.
[0002]

[Translation done.]

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PRIOR ART

[Description of the Prior Art]
Generally, a network contains the various devices which have the communication capability connected with the communication link and said communication link. Said device contains a computer, peripheral equipment, a router, a storage device, and the product possessing a processor and a communication interface. Devices various as one network embodiment can mention the home home network by which interconnection was carried out. The ordinary home can contain various devices containing the home device typically found in a personal computer and a home. The "device" as a term can contain other devices provided with the capability to exchange a logical device or functionality, and data typically, and can contain not only all the home devices but a general purpose computer. A home device A security system, movie theater equipment, TV, VCR, stereo equipment, The direct broadcast satellite service (DBSS: Direct Broadcast Satellite Services), water-drench system, lighting system with which digital satellite services (DSS: Digital Satellite Services) were known, A microwave oven, a dishwasher, oven/stove, a washing machine/oven, and an electron device like a processing system automatic in the car are included.
[0003]Generally, a home device is used in order to raise a landlord's life style and living standard. For example, a landlord does not need to wash tableware directly by hand by washing dirty tableware with a dishwasher. In VCR, TV program can be recorded so that a landlord may look at a specific program later. A security system protects a landlord's valuables and the anxiety of the landlord by the invader who is not desirable is reduced.
[0004]A home device like home movie theater equipment is controlled using a good single common control unit, i.e., a remote control. A landlord controls other home devices variously and enables it to order said single common control unit using a single interface. Therefore, the manufacturer has developed the control unit for controlling the home device and ordering from a single interface.

[0005]I hear that the demerit about the use of a remote control unit which controls a home device and is ordered provides the static command logic for controlling each home device and ordering, and there is. Other demerits about use of the remote control unit, I hear that a known remote control unit cannot control two or more various devices, and I hear that it is and two or more devices which have the different compatibility for carrying out two-way communication in order to work in details or to provide service cannot be controlled more, and it is.
[0006]With the conventional network system, a user provides a command using a remote control unit or a device control panel. If a user stops once, the control unit and device which provide the command for automation in a network will be lost. . It is indispensable, in order that the conventional system may work without a user not controlling the 2nd set of a device directly, and ordering it, after a user controls the 1st set of a device in early stages and orders. The mechanism for the 1st set of the device which communicates with the 2nd set of a device automatically in a network is not provided. The conventional system does not provide the efficient method of acquiring information to other network devices, in order that various network devices may perform command and control in a network.
[0007]

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]
Therefore, the method and system which provide the dynamic control of a device and a command are required of a home network. In order to work or to provide service, the method and system for providing the capability for two or more devices which have the performance which is different in carrying out two-way communication to be controllable are required. The method and system for providing the capability for various network devices to order automatically and to control other various network devices further are required. The method and system for providing the command and control information which are accessed general-purpose because of communication between devices are required.
[0008]

[Translation done.]

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MEANS

[Means for Solving the Problem]
This invention fulfills this necessity. A method and a system for this invention to give its service on a home network by a 1st embodiment are provided with the following.
A stage of connecting the 1st and 2nd home device to said home network.
As a stage of providing a database containing two or more application interface explanation data objects, A stage where each application interface explanation data object includes information for a command of a home device, and control in a format structurized by one or a home device beyond it connected to said network.
A stage where the 2nd home device accesses a candidate for the 1st application interface explanation for said 1st home device in said database.
A stage where said 1st home device accesses a candidate for the 2nd application interface explanation for said 2nd home device in said database, A stage of transmitting a command and control data to said 2nd home device from said 1st home device through said network using said candidate for application interface explanation for said 2nd device, A stage of transmitting a command and control data to said 1st home device from said 2nd home device through said network using said candidate for application interface explanation for said 1st device.
Thereby, said 1st and 2nd home device offers said service.
[0009]With one gestalt of this invention, said 1st home device stores the 1st application interface data, and said 2nd home device stores the 2nd application interface data. Said database is formed by asking the 1st and 2nd home device, in order to transmit said application interface explanation data for the 1st and 2nd home device to said database device. Said database is stored in a database device, or is connected to a network for general-purpose access by network device. Therefore, the 2nd home device is provided with a candidate for the 1st application interface explanation for said 1st home device from a

database through a network. The 1st home device is provided with said candidate for the 2nd application interface explanation from a database through a network.

[0010]Three or a home device beyond it is connected to a network, At least one home device accesses a database, in order to ask a candidate for application interface explanation of two or more home devices for transmitting a command and control data to two or more home devices through a network. Each candidate for application interface explanation has data in a structurized format. Said structurized format has an XML format.

[0011]The feature, a viewpoint, and an advantage of such this invention should be understood still better with following detailed explanation, a claim, and an attached drawing.

[0012][Embodiment of the Invention]

By one viewpoint, this invention provides communication between devices in a network like a home network. If a home device becomes more intellectual and information can be shared, it permits that the communication between devices carries out interconnection of the device in a network that a user has so that [the information-sharing performance of said device] it may be used. Similarly, in giving the capability to use flexibly enough the device connected with the network for a user, the communication between devices carries out a decisive role.

[0013]If drawing 1 is referred to, the network 10 contains at least one client device 12 and at least one server device 14 which were linked through the communication link 16 by one embodiment of this invention. The communication link 16 can include 1394 serial buses which provide a physical hierarchy (medium), in order to transmit data and to receive between the home devices connected variously. Said 1394 serial buses support a time-multiplexing audio / video (A/V) stream, and standard IP (Internet Protocol) communication both. By an embodiment, a home network uses an IP network hierarchy as a communication hierarchy for a home network. However, since other communications protocols provide a home network with communication, it may be used.

[0014]Each client device 12 can communicate with the server device 14 beyond one or it in the network 10. Each server device 14 can communicate with one or other server devices 14 beyond it and one, or the client device 12 beyond it in the network 10. Each client device 12 can include a user communication interface including the display which provides a control user interface so that it may interact with the device with which an input device like the mouse for receiving a user's input and a keyboard was connected with the network in the user. The user interface can include the GUI (Graphical User Interface) display 18 for providing a user with information. If drawing 2 is referred to, as it defined here, each server device 14 provides for a user the service which excepted the control user interface, and each client device 12 provides a control user interface for the user who interacts with the network 10. Thus, only the client device 12 interacts a user and directly and the server device 14 interacts only with the client device 12 and the server device 14. For example, the service can include MPEG sourcing /

sinking, and display service.

[0015]Drawing 3 is a block diagram showing the example of the home network 10 containing many client devices 12 and many server devices 14. Each server device 14 can contain hardware as resources for providing service for a user in a network. Furthermore, each server device 14 can store the server or the service control program 20 for controlling server hardware, As shown in drawing 4, the graphic controlled object (GCO: Graphical Control Object) user interface description 22 for a user interface can be included with the server control program 20.

[0016]For control between the control client device 12 and the controlled server device 14, the client device 12, For example, GCO22 of the server device 14 is accessed by transmitting GCO22 to the client device 12 from the server device 14 through a network. Then, GCO22 transmitted in order to create control user interface GUI18 for the user who communicates with the control program 20 of the server device 14 from the client device 12 through a network is used for the client device 12. A user provides the control program 20 of the server device 14 with control and a command from the client device 12 at least.

[0017]GCO22 storage of each server device 14 contracts processing of the client device 12, and a storage demand by the server device itself in a network with some server devices 14. Storing GCO22 with the server device 14 permits that each server device 14 provides a user with the GUI gestalt of the very thing, and sensibility, and it permits the correction or updating of GCO22 without correction with the client device 12.

[0018]If drawing 4 which provides the command and control between the client device 12 and the server device 14 by an embodiment is referred to, said client device 12, Renderer (Renderer)24 for being stored in the client device 12 or displaying GUI18 using GCO22 transmitted to the client device 12 through the network from the server device 14 of hope can be included. For example, said client-server 12 can fetch GCO22 of at least one server device 14 through a network by an early device selective state, Said renderer 24 displays GUI18 using GCO22, in order to control said server device 14. Desirably, said GUI18 is customized with the server device 14, and can contain the built-in instruction set made in order to control the server device 14.

[0019]Various GUI18 of the server device 14, For example : (1) The common GCO model type for the client device renderer 24 which displays GUI18, (2) The common communications protocol for transmitting GCO22 to the client device 12 from the various server devices 14, (3) To the control program 20 of the server device 14 corresponding from the client device 12 which does not search for the knowledge made with the control program of the server device 14 with which the specific server device 14 controlled corresponds a community like the common communications protocol for a GUI interaction. It can contain.

[0020]If drawing 4 is referred to again, the server device 14 can contain one or the server

control program 20 beyond it which controls server hardware, in order to provide service. The GUI interface 18 provides the server device control programs 20 with an interface from GCO22 of said server device 14. Said server device 14 can contain the control state data 26 which points out the control state of the server device 14 and server device hardware in providing the called-for service.

[0021]For example, the control state data 26 can include the state of control information by GUI18 for the server device 14 like the timer settings set up in order for a VCR server device to perform recording operation. The control state data 26 is stored in the controlled server device 14, and is displayed by the user through GUI18 of the server device 14 with the control client device 12 for user control of the server device 14. Desirably, the control client device 12 for displaying GUI18 of said server device 14 does not maintain the knowledge of the control state data 26 for the controlled server device 14.

[0022]Each server device 14 is controlled by one or the client device 12 beyond it. Therefore, the control state data 26 stored in said server device 14 includes the information state in GUI18 of the server device 14 with each control client device 12. For example, if user control is completed when a user controls the server device 14 using the 1st client device 12, The information in GUI18 of the server device 14 is stored in the control state data 26 of the server device 14 by the server device 14 with the 1st client device 12.

[0023]While a user interacts with GUI18 of the server device 14 with the 1st client device 12 on the other hand, The control state data 26 of said server device 14 is updated with the 1st client device 12 by the information in GUI18 of the server device 14, and if user control is completed, said control state data 26 will be maintained with the server device 14. When a user controls the server device 14 using the 2nd client device 12, said control state data 26 is made so that a user can use through GUI18 of the server device 14 with the 2nd client device 12 for the control which follows. In order that a user may control the server device 14 again henceforth, the 1st client device 12 can be used, Said control state data 26 is made here so that a user can use through GUI18 of the server device 14 with the 1st client device 12 for the control which follows. Since the clock 28 is included again, or the time delay operation based on the time or the clock inputted by the user is permitted so that it may be mentioned later, said server device 14 can maintain current time.

[0024]The client device 12 and the server device 14 can be physically connected with one unit together, for example like DTV. In that case, said client device 12 provides the server control program 20 with a control user interface at least including the control program 20 for said server device 14 to control server hardware for control of server hardware, and a command. Drawing 5 is a drawing in which the example of the client device 12 is shown, and is (1). PDA for a GUI display (RemoteC), (2) DTV (STB) containing the sink server which displayed GUI and comprised an audio and/or a video program stream destination server, (3) GUI is

displayed, and in order to provide multiplex service, PC containing at least one server device can be included. The hardware or the thing which can be performed in DTV or PC client device is controlled by other client devices. Drawing 6 is a drawing in which the example of the server device 14 is shown, and is (1). DVDP SmartCard as a sauce server device, (2) The audio amplifier as a sink server device, and (3) DVCR as sauce or a sink server device, and (4) The managing server for managing a remote server device is included. Said managing server can contain DSB-STB, cable TV-STB, or ATSC-STB. Such a device contains the managing server for the local control of STB internal work, or management. The external server accessed through the external network may be used by the local client device, for example for service like Video-on-Demand, Enhanced-TV, and Internet commerce.

[0025]If drawing 7 is referred to, the communication and control between the two server devices 14 will be performed by the control program 20 of the server device 14 which communicates the instruction word and control data of these between. The server device 14 can control one or other server devices 14 beyond it through a network. And the server device 14 is controlled by one or the server device 14 beyond it and one, or the client device 12 beyond it. In order that a user may control and order the 1st set of the server device 14, can use the client device 12, and the 1st set of said server device 14, Without the ability to confuse [it is indispensable in order to give its service to a user, and] a user, it orders automatically and the 2nd set of the server device 14 can be controlled.

[0026]For example, in order to perform automatic time-delaying operation, a user "logs on" to the client device 12 which controls the 1st set of the server device 14, and can specify service of hope. And a user "logs off" off said client device 12. Since communication and control are performed among these very thing and one or the server device beyond it provides service of hope without a user's intervention in the gross by the 1st set after that, the 1st set of the server device 14 is indispensable, and it controls the 2nd set of the server device 14 automatically.

[0027]Drawing 7 is a drawing in which the embodiment in which the two server devices 14 carry out two-way communication, and which they control is shown. Each server device 14 contains the control program 20 mentioned above, the clock 28, and the control state data 26 mentioned above. Each server device 14 can contain GCO22 by which the server device 14 is controlled directly with the client device 12 again. However, GCO22 does not need to be controlled directly by the client device 12, and does not need to be contained in the server device 14 which merely communicates with other server devices 14. Each server device 14 includes the instruction word (CL: Command Language) interface 30 and an instruction word library again. Since said server device 14 provides the service, said instruction word library includes the command which uses information for transmitting and receiving. however, drawing 4 -- and as mentioned above, an instruction word is not certainly required because of user control.

[0028]Drawing 8 shows the example of the audio / video (A/V) model which contains the sauce server device 14, the sink server device 14, and the client device 12 in a network. Said sauce server device 14 contains the control program 20 for controlling the data stream sauce hardware 32 of the sauce server device 14, Said sink server device 14 contains the control program 20 for controlling the data stream sink hardware 34 of the sink server device 14. In order that a user may work the data stream sauce hardware 32, the sauce server device 14 is controlled by illustration operation, and in order to work the data stream sink hardware 34, the client device 12 which controls the sink server device 14 is used. In initializing the data communications from the data stream sauce hardware 32 to the data stream sink hardware 34, a user gives up said client device 12. Because of other one side, the user can program future initial-data transmission and gives up the client device 12. The data stream sauce hardware 32 of the sauce server device 14 and the data stream sink hardware 34 of the sink server device 14 initialize data communications automatically henceforth at the time programmed by the user.

[0029]For example, said data stream sauce hardware 32 can contain a tuner access device like direct broadcasting by satellite (DBS: Direct Broadcast Satellite). DBS is a multiplex-channel replaced with cable TV, and provides a small satellite disk (3 foot 18 inches in diameter) with television programming like a cable directly from a satellite. It permits that 200 or more channels also receive the satellite disk located in the place where some standard analog TV signals were compressed in digital one by the single satellite transponder, and the air was specified with DBS. Said data stream sink hardware 34 can contain the command and digital video cassette recorder (DVCR) which can carry out decoding of the digital video signal compressed at the time of reproduction. A user provides the command and control data containing the "time-delay recording" event data for DVCR, and the "time-delay selection program" event data for a tuner access device. Said tuner access device chooses the program of hope after time delay, and from a user, even when he has no additional control operation, DVCR which receives and records program data is provided with source program data.

[0030]Furthermore drawing 9 contains sauce server device 14 SERVER1, sink server device 14 SERVER2, and the client device 12 in a network at least, it is a drawing in which other A/V models are shown. In order that said client device 12 may choose and control server device 14 SERVER1, and SERVER2 and other server devices 14, for example, SERVER3 and SERVER4, (not shown), The administrator 36 with the user interface which displays the selection information for a user is included. Selection information contains the icon symbol assigned to Serv1, Serv2, Serv3, and Serv4 by the session management person 36 for the user who chooses respectively server device 14 SERVER1, SERVER2, SERVER3, and SERVER4. Said sauce server device 14 SERVER1 can contain DVCR, and said sink server device 14 SERVER2 can contain 1/2DTV.

[0031]as an example of operation -- the server device 14 -- in selection of SERVER1 and SERVER2, Said client device 12 transmits GCO22 of each server device 14 to a client device, and displays each server device 14 SERVER1 and GUI18 corresponding to SERVER2. The user can interact with control and GUI18 of each server device 14 which provide a command to the server device [/ for service] 14. Each server device 14 is combined with the server device 14 of independent or others, and can provide service. In order to give one's service, the server device 14 needs said session management person 36, and he transmits the control state data 26 between GUI18 of said server device 14 with said client device 12. Based on user control and instruction information, the two or more server devices 14 can communicate a command and control information in between [these], in order to provide the service for which a user asks.

[0032]Said session management person 36 can contain the software agent who has a function which accesses the useful home network service provided by the various server devices 14, and displays it in the network 10. Said software agent adjusts the performance of the various server devices 14 in the network 10 additionally, and the selection information only for said server device 14 which has compatible performance is displayed. The selection made from GUI18 of the one server device 14 so that a user might provide the command and control information where the server device 14 has a meaning, and the selection made from GUI18 of other server devices 18 are adjusted by the session management person 36.

[0033]The session management person 36 searches a network with the example of further others of operation, and performs in it the software agent who finds the server device 14 connected to the network. Said software agent accesses the performance data stored in each server device 14, in order to opt for the performance of the server device 14 again, and he provides a user with the information over the performance. And said session management person 36 displays selection icon Serv1, Serv2, Serv3, and Serv4 for server device SERVER1, SERVER2, SERVER3, and SERVER4, as shown in drawing 9.

[0034]Said session management person 36 makes all the selection icon Serv1, Serv2, Serv3, and Serv4 enable in early stages so that a user can choose in all the four icons. After a user clicks on a Serv1 selection icon and chooses server device SERVER1, said session management person 36 determines that he cannot carry out the performance top compatibility of the server devices SERVER3 and SERVER4 with server device SERVER1. Therefore, said session management person 36 does the disable of the selection icons Serv3 and Serv4 respectively for the server devices SERVER3 and SERVER4. And the user can click on the icon Serv2, in order to order and control server device SERVER2.

[0035]Like interacting with GUI18 of the server device 14 with which the user was chosen, the control and instruction information which were inputted into each GUI18 by the user provide the additional performance information which has on the server device selection which follows

by a user. For example, if the VCR server device 14 is chosen, it will be influenced by the determination of the user on whom operation of succession by the session management person 36 plays or records the selection icon for other server devices 14 in enabling or carrying out a disable.

[0036]In a network, each server device 14 has one or the service performance beyond it, as mentioned above through the example about the server device shown in drawing 9. Each service performance contains sourcing or sinking of information. TV has the sinking performance which receives video and an audio stream -- VCR -- video and an audio signal -- sauce (transmission) -- and a sink (reception) can be carried out, and PC can transmit and receive video, an audio, and data. Each sourcing performance has complementary and interexchangeable sinking performance. In this and resemblance, each sinking performance has complementary and interexchangeable sourcing performance. For example, video output performance is complemented with one device by the input video performance of the device of further others.

[0037]an other services with each devices 14 various on a network sake -- sauce -- or since a sink is carried out, as shown in drawing 10, each device 14 stores a performance data table (performance table 1). The 1st row of the table 1 checks the service performance of the device 14, and said device 14 checks sauce or sink **** for the service corresponding to the 1st row in the 2nd row. New service is performed using the performance data table 1, while maintaining still older device and compatibility. For example, if still older service and the new service by which compatibility is carried out are developed, An execution device can be written in the performance data table 1 for the device which offers said new service as it maintains the old device and compatibility which use service with both old new service and old service.

[0038]By a 1st embodiment, a device administrator performs matching or comparison of sauce and a sink service device. For example, said device administrator can also perform the role of the software agent who compares the performance and the characteristic of the various devices 14 and the specified device 14 with compatibility matching. Service even the 2nd device 12 from the 1st device 14 over a network In for example, the case of a media stream. the 2nd device 14 with which compatibility of the user is carried out to the performance of the 1st device 14 for said device administrator -- judgment -- the performance of the 1st and 2nd devices 14 is compared so that it may be powerful and can choose. Next, the example of the service performance list of [for the embodiment of the server device 14] is shown. Stream_format_video_dv Stream_format_video_mpeg2tpt Stream_format_video_dsstpt Stream_format_video_mpeg2pes Stream_format_ video_mpeg210901-tpt [0039]As shown in drawing 11, each device 14 stores further the characteristic data table (characteristics table 2) containing the characteristic about a device. A name and a price define each characteristic by the table 2. It is not required although character length is shown in the table 2. Said

characteristic data is useful to other devices 14 which make information processing interoperability easy on the network 10, and store device information. For example, a device page uses the characteristics table 2 which stores a device name so that it may be mentioned later. Other fields can be added to the characteristic data table 2, when required.

[0040]With the user-client device control model mentioned above, characteristic data is displayed on the GUI page of the server device 14 with the client device 12. Since said characteristic data is displayed, the 2nd level device information homepage may be used for others. A text or the characteristic data of the gestalt of an XML (Extensible Markup Language) file may be accessed by the software agent. The characteristic data for the device controlled for the device device control model is stored in a device interface and an application interface.

[0041]With the characteristics table 2, said device position-characteristics field is used in order to store the position or group for each device 14. The device type characteristic field writes in the device type for the specific device 14 like VCR, DVD, DTV, a camcorder, PC, and a security system. Supposing the device itself does not supply a device icon, said device type characteristic field will be used in order to select the default device icon which expresses a device on a device page. The characteristics table 2 can include the multiplex writing for default sauce and the default sink characteristic field. Such each writing expresses other default sauces or sink devices 14 for each data type processed by the device 14.

[0042]Desirably, performance and characteristic data are packed by the data structurized using the hierarchy language. This provides the performance used for other purpose like GCO transmission and server device server device control, and the common method of recovering the characteristic. For example, characteristic data can include the data format by which the next was structurized.

<DEVICEATTRIBUTES> <ATTRIBUTE name=DeviceManufacturer value="Samsung Inc."> <ATTRIBUTE name=ManufacturerURL. value=www.Samsung.com>. <ATTRIBUTE name=ManufacturerIcon value="logo.gif"> <ATTRIBUTE name=DeviceName value="Samsung DSS"> <ATTRIBUTE. name=DeviceModel value="SCH1900" > <ATTRIBUTE name=DeviceType value=DDS> <ATTRIBUTE name=DeviceLocation. value="Livingroom">. <ATTRIBUTE name=DeviceIcon value="device.gif"> <ATTRIBUTE name=DeviceAddress value=105.144.30.17> </DEVICEATTRIBUTES> [0043]As an example, the performance data can include the format by which the next was structurized.

<DEVICECAPABILITIES>. <CAPABILITY type=MPEG 2. value=Source> <CAPABILITY. type=MPEG2 value=Sink> <CAPABILITY type=MPEG3 value=Source> <CAPABILITY type=MPEG3 value=Sink> </DEVICECAPABILITIES> [0044]An application interface language is used so that other server devices 13 may perform device device control including a server device server device. It can be described using XML that said application interface language was later mentioned including the instruction word. The control program 20 of the one server

device 14 controls the control program 20 of the server device 14 of further others without a user's intervention distantly through a network, not using GUI18. The example of control of a device device is automation. since control through the client device 12 is provided and a user subsequently provides [the two or more server devices 14] service in early stages for service of hope, even when it has no interaction of a user, he is mutual -- it communicates automatically and controls.

[0045]If drawing 12 and drawing 13 are referred to, it will be used so that information processing interoperability may be permitted among the various control programs 20 in the desirable server device 14 with a various standard application interface language. By one embodiment, said standard application interface language, (1) of the following configuration blocks The functional standard block 40 of service like a service-function database, and (2) The block (42) with which a message element is constituted, (3) The industrial standard format block 44 and (4) The message character string configuration block 48 which outputs the message compressed block 46 and the structurized message data is included.

[0046]Drawing 12 is a drawing in which the example of composition of the configuration block which performs a command message generating function is shown. Each message item comprises a functional standard of service, and is standardized by choosing an industrial standard compression form (Hex) label to a message item. A group like a message item is together put in order to make a perfect instruction-character sequence. The instruction word which exists like CAL and AV/C operates, as shown in drawing 12. However, the instruction word mechanism specifies binary code or a hexadecimal-code message, and a system operation to a physical unit on a physical interface, and is based on hardware regulation. therefore, the application level which the one software application program 20 in the controller device 14 specifies the position of the software application 20 of further others in the device 14 by which it was controlled on the network, and the instruction word controls -- that is, It is not so desirable to the network hierarchy based on the control mechanism of the control system standard which contains a name, an address, device performance discovery, communications language, and a command message on a software level. Said control mechanism is further suitable to a device like the digital device containing versatility like a computer, and not only a multiplex application device but a device like DVCR.

[0047]Drawing 13 is a drawing in which the desirable example of the configuration block of drawing 12 which performs a command message generating function is shown. By drawing 13, the position of the industrial standardization format 44 and the message compression 46 differs from drawing 12. Many text normalization forms are chosen from the functional standard service 40 which makes a perfect message. Said message is later compressed by the lower hierarchy of a protocol stack. Drawing 13 expresses how to perform service or device command, and control to electric appliance CE. Message composition is defined by XML

standardization syntax and message compression is performed by protocol hierarchy of further others like HTTP. Command interface language is used for an application software 20 interface level rather than a low rank hardware level. Therefore, a network protocol stack is managed with the command in said language, and each controller device 14 and the controlled device 14 are shown as composition with which the network was unified for the message transmission of these between.

[0048]If drawing 14 is explained, three embodiments of three interactions between the client device 12 and the server device 14 are shown. A user communicates with remote service application"S" by "A" a 1st embodiment. Although said user uses a browser with a client device as a user interface, Asynchronous instruction message posting of .XML base which said browser controls the service program 20 by service application"S" here, and receives a response in HTML (Hyper Text Markup Language) or an XML format. The second server provided with the browser to accept is contained. For example, in DVCR, the second server 14 accepts a command message like "VCR FAILED:TAPE BROKE". Since the command message for a user displays within GUI of a browser for control of the succession attention by a user, and DVCR, the software agent containing a browser is used. Desirably, the client device 12 of an XML base includes the HTTP1.1 server performance which answers the command initialized elsewhere for server device versus server device control, and a command.

[0049]A user is exchanged by the software client control program 50 by "B" a 2nd embodiment. Said software client control program 50 generates command posting to service application"S" of an XML base, and receives XML command posting replied. And said software client control program 50 is exchanged by "C" a 3rd embodiment by application [like the server device control programs 20 exchanged between the two service applications 20] whose command and response are. In this point, it is when embodiment "embodiment in which B" has NARU (Null) service" C" is special.

[0050]The application interface language based on XML, It is used in order to control between the 1st server device 14 and the 2nd server device 14 (a device pair-device or service pair-service) for the device enabled by World Wide Web or the Internet or service. An application interface language is due to a web standard and a middleware hierarchy. By one embodiment, it includes that device device control controls the control program 20 or application by the network 10 distantly with the one server device 14 from the server device 14 of further others. Therefore, the interface (API) to the application 20 can be used through the network which uses API extension. Desirably, said API extension uses a standard format like an interface based on XML, in order to provide the whole information processing interoperability.

[0051]Drawing 15 is a block diagram showing the API extension for the 2nd application B designed as the 1st application A and B designed as the service A which communicates within

a network. For example, the service A is a control program for the 1st server device A in a network, and the service B may be a control program for the 2nd server device B in a network. The server device B transmits a command to the server device A. For example, the 1st and 2nd service devices A and B contain CE device.

[0052]If the API extension for the service A is referred to, the 1st top block 52 provides a synthetic definition or database of the method for CE using the English word explaining CE device. The synthetic definition or database which uses .XML which can exist in other formats as which said synthetic definition or the database can express C, XML or an object, and the method of these each one is called a XCE definition. 54 provides the 2nd block of the format which expresses API by XML form for all the devices 14 designed by interface data-type definition INTERFACE.DTD.

[0053]The software agent designed by the means A uses the subset of the XCE definition for the service A, and uses interface data-type INTERFACE.DTD for the service A which generates an XML gestalt document, and INTERFACE-A.XML. Said document INTERFACE-A.XML explains the object and method which are supported by the service A according to document type definition INTERFACE.DTD for the service A. Other data-type definitions are used in order to draw up an INTERFACE-A. XML document again.

[0054]The software means A generates again the look rise table 56 compiled by the look rise table 56 changed from the XML message to the service A programmed by C, and the binary number which can be performed from the service B on a network interface. The look rise table 56 is desirably created by compile time, The method (Method) message (command) of an XML gestalt inputted from the service B is changed into the API form created by the application C code compiled for the service A between ****- times here. Said look rise table 56 provides the ****- time translation changed into a request peculiar to the device for A as method request service for XML. The look rise table 56 is compiled with the device control programs 20 for execution local on the server device A for the service A.

[0055]INTERFACE-A.XML is used by the service A for the Tokimasa this sex check which the error generated by the received message. Before INTERFACE-A.XML communicates with the service A again, it is used by external application like the service B which determines the message format for the service A. If the message to the service A generates an error from the service B, the service B can access an INTERFACE-A. XML document, in order to diagnose an error.

[0056]If the API extension to the service B is referred to, the synthetic definition or database for [like a XCE definition for said service A of the above / 58 / the 1st block] CE is provided. The following block 60 provides the remote API service or the device like API for the service A with the language definition for the XML gestalt method (command) call. Said language definition is document type definition method request CALL.DTD which explains an interaction with an

object on a network.

[0057]The software agent designed by the means B, In order to create the look-up table which changes into an XML form method request C program code compiled in the command for the service B, the object within the XCE regulation for the service B and the subset of a method are used at least. Therefore, the look rise table 62 provides conversion between the XML document which crosses a network interface with the method and the service A which were caused by the service B (for example, "reproduction"), and performs a method call, or a message, for example. The subset of the XCE definition used by the software means B is dependent on network use extension and essence. For example, said subset can be chosen in order to provide the use which all the possible services were comprehensive, or was restricted on a home network.

[0058]Therefore, said API extension provides communication among devices various on the network which uses XML. In the aforementioned example, the program code 20 for the service B generates a method call by API, The .XML method call (message) from which an API call is changed into the web / Internet standard XML for internal-device communication in an XML gestalt at conformity is transmitted to the service A through a network, The service A reconverts the XML method call from a network interface to the program code API definition for the service A. Said conversion and re converts provide the web / Internet compatibility for the various devices in the network which has program code API which requires binary compatibility of ** among other devices. The embodiment of the XML interface block which uses the block diagram in drawing 15 is shown below.

---------- interface.dtd rules for describing an object interface in xml ---------- <!ELEMENT parameter. # PCDATA><!ATTLIST parameter. valueCDATA #REQUIRED><!ELEMENT method (#PCDATA,(parameter)+)><!ELEMENT object (#PCDATA)<!ELEMENT call (object, (method)+)> ---------- interface.h example object interface in c ---------- /*object*/typedef struct stream{int id;};/*method*/void StreamPlay(int id,intspeed);void StreamStop(int id); ---------- interface.xml the same object in xml using ruels of interface.dtd ---------- <object>Stream <method>Play<parameter type="int"> id</parameter> <parametert ype="int"> speed </parameter>. </method> <method>Stop <parameter type="int">id</parameter> </method><object> ---------- call.dtd rules for describing a c function call in xml ---------- <! ELEMENT parameter. # PCDATA><!ATTLIST parameter. TypeCDATA #REQUIRED><! ELEMENT method (#PCDATA,(parameter)+)><!ELEMENT method (#PCDATA,(method)+)> -- ---------- controller.c example controller command in

c ---------- ...StreamPlay(0x1ae,500);..
.---------- call.xml the same command in xml using call.dtd---------- <!-example to play a. stream--> <call> <object>stream</object> <method>Play</method> <parameter value="500">speed</parameter> </call> [0059]The example of interface definition INTERFACE.DTD used so that the explanatory note document of INTERFACE.XML of the explanatory note document of the available service mentioned above might be drawn up above, and CALL.DTD is shown. Said CALL.DTD definition includes the regulation set for generating a method call like XMLRPC (Remote Procedure Call) or a XMLRPC message, or a function call message. Said CALL.DTD definition explains the output interface of the controller service 14. It is a home network and INTERFACE.XML expresses available service on a home network, for example. Available service is a subset of whole service in CE field.
[0060]A user controls a tuner access device like satellite STB by an OTR (One-Touch-Record) outline. A user controls tuning using EPG (Electronic Program Guide) like a graphics user interface expression which shows a program list. OTR recording provides the service which includes selection of a future program from EPG so that it can record without accessing a VCR graphic user interface, in order that a user may program VCR for the recording by which time delay was carried out. OTR automates control of VCR. : (1) whose following is an illustration motion-control list of OPR.XML The selected program stream outputted to the network from StreamOpen= satellite STB for reproduction;OTR. ; (2) with this control local to an STB device StorageOpen= storage service opening; and (3) A StorageRecord= network is led and it is recording command transmission to VCR.
---------- call.dtd rules for describing a c function call in xml ---------- <!ELEMENT parameter. # PCDATA><!ATTLIST parameter. valueCDATA #REQUIRED><!ELEMENT method (#PCDATA,(parameter)+)><!ELEMENT object (#PCDATA)><!ELEMENT call (object,method)> ---------- interface.dtd example for describing an object interface in xml ---------- <!ELEMENT parameter. #PCDATA><!ATTLIST parameter valueCDATA #REQUIRED><!ELEMENT method (#PCDATA,(parameter)+)><!ELEMENT object (#PCDATA,method+)> ---------- ---------- interface.xml this document describes various CE services offered-a subset of the whole CE space.
---------- <?xml version="1.0"?> -- < -- !. DOCTYPE interface SYSTEM "interface.dtd" ><object>Stream <method>Open <parameter. type="int" >id </parameter>. <parameter type="int"> channel</parameter> </method> <method>Close<parameter type="int"> id </parameter>. < -- /-- method -- > -- < -- /-- object -- > -- < -- object>Control -- < -- method>Set -- < -- parameter type -- = -- " -- int -- " -- > -- id -- < -

- /-- parameter -- > -- < -- parameter type -- = -- " -- int -- " -- > -- level -- < -- /-- parameter. >. < -- /-- method -- > -- < -- /-- object -- > -- < -- object>Storage -- < -- method>Open -- < -- parameter type -- = -- " -- int -- " -- > -- id -- < -- /-- parameter -- > -- < -- parameter type -- = -- " -- int -- " -- > -- channel -- < -- /-- parameter. > </method> <method>R. ecord /[<parameter type="int"> id<] parameter> </method> <method>Play <parameter type="int"> id </parameter>. <parameter type="int"> speed</parameter> </method> <method>Stop <parameter type="int"> id </parameter> </method>. <method>Close <parameter. type="int" >id </parameter>. < -- /-- method -- > -- < -- /-- object -- > -- < -- object>Display<method>Open -- < -- parameter type -- = -- " -- int -- " -- > -- id -- < -- /-- parameter -- > -- < -- parameter type -- = -- " -- int -- " -- > -- channel -- < -- /-- parameter. > -- < -- /-- method -- > -- < -- method>Render -- < -- parameter type -- = -- " -- int -- " -- > -- id -- < -- /-- parameter -- > -- < -- /-- method -- > -- < -- method>Blank -- < -- parameter type -- = -- " -- int -- " -- > -- id. </parameter> </method>. <method>Control <parameter. type="int" >id </parameter>. < -- parameter type -- = -- " -- int -- " -- > -- cid -- < -- /-- parameter -- > -- < -- parameter type -- = -- " -- int -- " -- > -- level -- < -- /-- parameter -- > -- < -- /-- method -- > -- < -- method>Close. <parameter type="int">id</parameter> </method></object><! ---------- otr.xml. an xml representation. of one touch record. c . representation:. StreamOpen(100,2);/*play a stream(pushed by satellite feed*/ StorageOpen(24,2);/*open a storage service*/ StorageRecord(24 ; /*record the stream*/ ---------- <?xml version="1.0"?>. <!DOCTYPE interface. SYSTEM"call.dtd"> <call>. <object>stream </object>. <method>open </method>. <parameter value="100"> id<channel [/parameter> <parameter value="2">] </parameter> </call> <call> <object>storage </object>. <method>open </method>. <parameter value="100"> id<channel[/parameter> <parameter value="2">] </parameter> </call> <call> <object>storage </object>. <method>Record</method> <parametervalue="100">id</parameter> </call> [0061]As it argued about drawing 15 in the top, the 1st device B accesses the INTERFACE. XML document of the 2nd device A, in order to investigate the details matter of the device performance of A, and an API interface, and can determine the function in which the 2nd device A was supported, and a command item. Specially, said 1st device B can determine overlapping supported by the 1st device B and the 2nd device A, and the method of following and using. Drawing 16 shows the example which accesses the INTERFACE-A. XML document of the 2nd server device A with which the 1st server device B containing the application B contains the application A. Said 1st server device B contains INTERFACE-B.XML for the 2nd server device A to compare with an INTERFACE-A. XML document.

[0062]Said 1st server device B tends to control the 2nd server device A by one scenario in a network. The INTERFACE-A. XML document of said 2nd device A is transmitted to the 1st server device B from the 2nd server device A, and is used by the application B which asks the

performance and the API interfacing method of the 2nd server device A. This permits that the 1st server device B controls the 2nd server device A using XML remote procedure call XMLRPC. In other scenarios, after said 1st server device B tries the 2nd server device A and communication once [at least] and communication confirmation fails in it, it performs the above-mentioned stage. In other scenarios, said 1st server device B is distantly asked to INTERFACE-A.XML in the 2nd server device A, without transmitting an INTERFACE-A. XML document to the 1st server device B.

[0063]In investigating the item of an INTERFACE-A. XML document, said 1st server device B can create the command for transmitting to the 2nd server device A in an XML format, as mentioned above. Generally, as said 1st server device B was mentioned above, even if [a part of] it has little INTERFACE-A.XML overlapped by the XCE definition subset used by the 1st and 2nd server devices B and A, it can interpret an item. Supposing said 1st server device B cannot interpret the partial item of an INTERFACE-A. XML document, the 1st server device B can disregard the portion, or can fetch the application assisted so that it may explain by translation that it is later mentioned by the portion.

[0064]If drawing 17 is referred to, other examples which control the device device or internal device between the controller server device 14 and the controlled server device 14 are shown. Said controller device 14 contains the application C which can perform the controlled device 14 including controller application. The controlled device 14 includes application interface explanation of INTERFACE-A.XML and the application C further. The application E accesses the application interface explanation A in the device 14 controlled in order to ask the performance of the device 14 and the controlled API interfacing method of the server device 14 which were controlled. Next, the application E orders and controls the application C using an XML remote procedure call, in order to control the controlled hardware of the device 14 or the service D. A scheduler device may be the 1 case of the controller device 14 which will be driven if the day set like the time-delay-recording control machine of VCR comes.

[0065]By the 1st example, said application E accesses the application interface explanation A by remote reference which led the network. By the 2nd example, said application E accesses the application interface explanation A by transmitting the copy of the application interface explanation A to the controller device 14 from the controlled device 14. Next, the application E is locally asked to the interface explanation A. It is transmitted to the library device 64 which the application interface explanation A provides with library space by the 3rd example for interface explanation, and the application E asks the interface explanation A distantly in a library. Said library device 64 stores the address (URL) of the related application which can use a direct control action and response.

[0066]If drawing 18 is referred to, an XML protocol provides a web standard common middleware hierarchy in the communications stack 66 on the API level between the

applications 20 of the various devices 14 with a network. The topmost part application of a communications stack transmits and receives a communication message through a network with each device 14, and it communicates with a software hierarchy by the device stack which controls locally the device hardware or service software for a device.

[0067]It is used in order that 1st XML layer API designed by XML layer OUT 68 may transmit a message, and 2nd XML layer API designed by XML layer IN 70 is used in order to receive a message. Document type definition CALL.DTD by which XML-defined, namely, the XCE definition and the method call were mentioned above is used so that XML layer OUT 68 may be generated. Document type definition INTERFACE.DTD by which XML-defined, namely, it was furthermore mentioned above for the XCE definition and the method call is used so that XML layer IN 70 may be generated. For example, controller application uses XML layer OUT 68, and uses application ENXML layer IN 70 controlled.

[0068]If drawing 19 is referred to, the embodiment of further others of a server device server device command and control structure is shown. XML-base control structure is used for the device driven by a web and the Internet, or the device device (service pair-service) for service. The 1st device A can control the application 20 by the 2nd device B distantly through the network which uses an XML command message. The interface to each device is described by XML format including the interface to application within said device. Said interface is extended on a middleware hierarchy through a network for the correction and explanation by other devices, and can become usable so that it may be mentioned later.

[0069]Each server device A and B includes the hardware and software for controlling other server devices through a network and being controlled by other server devices through a network. In drawing 19, the home network device A is a controller device or a module, and the home network device B is the controlled device or module. Each device A and B includes the local device XML interface 72 which comprised interface document INTERFACE.XML and document type definition INTERFACE.DTD. An INTERFACE. XML document includes explanation of the object supported by the corresponding device 14, a method, and a parameter. Said INTERFACE.DTD document is used with the XML interface of a device for a concrete justification check, as mentioned above.

[0070]Each device A and B contains XML parser (Parser)74 which comprised a program code for carrying out parsing of an XML message like [again] an XML interface and a XMLRPC command, and checking it. Said XML parser 74 is similar to said XML hierarchy IN 70 mentioned above about drawing 18. Each device A and B, In order to reproduce the method name and parameter of XMLRPC, the XMLRPC decoder for carrying out decoding of the XMLRPC encoder and the XMLRPC message inputted for carrying out encoding of the method name and parameter which are sent out from a XMLRPC message is included. The XMLRPC codec 76 becomes independent of the device XML interface 72 and device device control

structure, and use of a XMLRPC format is permitted, without changing other features of device device control structure from it.

[0071]Interface Fetscher (Fetcher) who comprised a program code, It is used by each device A and B in order to fetch the device interface of the device of direct further others from the device or the home network interface library 80 of further others. If the device 14 is a controller device, the controller application program code 82 in the controller device 14, A command and control of other devices 14 are affected through a network by controlling the software and hardware in the controller device 14 like XML parser 74, interface Fetscher 78, and the XMLRPC codec 76. If it is the device by which the device 14 was controlled, the controlled application program code 84 in the controlled device 14 will control the software and hardware in the device 14 for the device 14 controlled by other devices 14. The home network device web server 86 in each device A and B manages communication between the devices on a network. XML to the peculiar look-up table 88 in each devices A and B X, It is used by the controlled application 84 which changes a MLRPC message (for example, a method name, a component name, and a type) into the peculiar interface (for example, the peculiar method name, a component, and a type) of a device. Within an XML message, said table 88 is not used, when the peculiar interface of a device is the same as the name of a method and a parameter.

[0072]As for each device A and B, each hair drier 90 contains the pointer to the peculiar embodiment of a specified device function from application 84 controlled inside, including one or more hair drier (Handler)90 further. The peculiar embodiment of a device function contains the binary code in execution time with most devices. Binary code is generated by compile duration from a high level language including C and Java. Therefore, the electric appliance manufacturer can add the hair drier 90 which was superior to that for a new function without affecting the existing hair drier and functional embodiment. The hardware service 92 includes the peculiar embodiment of a device function with each device A and B. Each device A and B includes the peculiar interface 94 which possesses API by the peculiar embodiment of a device function again.

[0073]Furthermore, The request broker for a home network (HNORB: .) Home Network Object Request Broker79 and a request broker for a network like an interface library (IL: Interface Library) provide the middleware hierarchy 98 for the home network 10. As shown in drawing 19, said middleware hierarchy 98 can be located in the 3rd device 96 or the separated control hub. Said HNORB79 contains the software agent for being used by the one device 14 which finds existence of other devices 14 connected to the network 10. Said HNORB software agent organizes a device name by the hierarchical tree structure of a name, organizes a device interface in said interface library which can be searched, and provides with a device interface the device which demands interface information.

[0074]The middleware hierarchy who comprised HNORB79 and IL80 is directly connected with

the Internet like the selected home device accessed from the specified outside of the local home network 10. The middleware hierarchy 98 in one local home network is connected to the middleware hierarchy 98 by other local home networks through the Internet, in order to provide the network provided with the two home networks 10 integrated. In such a case, the attested user who has suitable stream coding can access a user's 1st domestic DVD changer (Changer) from a user's 2nd domestic TV, in order to play video and to watch it by TV.

[0075]In order to use said interface library 80, at least one HNORB&IL should be working on the local home network 10. One or more HNORB&ILs are used again. For example, all of a cable modem, some DTV, and a central home hub can have a HNORB&IL software agent of these very thing. In order to define the position of HNORB&IL, the device 14 transmits a broadcast massage through a local home network. 1st HNORB&IL which answered with the device 14 is used by the device 14. If HNORB&IL is located once, the device 14 and HNORB&IL will register, Device lookup service can be checked between [TCP (Transmission Control Protocol) or UDP (User Datagram Protocol)] the points for an interface request and fetch. If an UDP protocol cannot be used, it is used for high bandwidth width connection [like IEEE1394] whose TCP protocol is. XMLRPC of a HTTP-base is used for the device for HNORB&IL communication. For example, in order that the device 14 may pass a device interface as one or more components, the "register" method of HNORB can be called distantly, Or the XMLRPC call can reproduce a partial or overall device interface from IL as a value which XMLRPC-answers or returns.

[0076]As mentioned above, one or more HNORB&ILs can operate by the local home network 10 simultaneously, Each HNORB&IL can recognize the subset of an usable device here, and one HNORB&IL can communicate with other HNORB&ILs in order to locate the device 14 which is not found. Multiplex HNORB&IL on the one local home network 10 can be automatically located mutually by using a broadcast massage like UDP and TCP. In such a case, multiplex HNORB&IL constitutes the request broker for distribution, while many interface libraries 80 constitute a distributed interface library. In order to provide a fault-tolerant error, supposing one HNORB&IL must finish suddenly, all the devices registered with this HNORB&IL will be notified, and said device will be automatically registered with other useful HNORB&IL.

[0077]Each device interface has a single logical name on the consistent target put together. The position of said device, or also after a network address actually changes, a single logical name can be used for other devices on said consistent target which recognizes a device and accesses it. Mapping of a device address is actually treated by HNORB with mapping of a logical name by the software agent for naming service. Desirably, the standardized naming method is used. More desirably, in order to operate a device name by a hierarchical tree structure, a hierarchical naming structure is used. This hierarchical structure can be expressed

to a file system and resemblance using "/." Although the structure is based on other positions like other service types like a home / MPEG 2/TV, or a home / sitting room / VCR, it is generated by other methods like. Various naming trees can live together for execution and efficiency.

[0078]In the command between the controller server device A in drawing 19, and the controller server device B, and the example of control, said middleware hierarchy 98 is in the 3rd device 96, or may be in the separated center hub. A dark block shows the device configuration element used for the special command shown in drawing 19, and the control processor. After the devices A and B become usable through a network and become accessible by an operation scenario, as for each device, the XML interface of itself and that is written in / submitted at the center HNORB and the IL middleware layer 98. If the center HNORB and IL middleware hierarchy cannot use it, each device broadcasts a message through a local home network, in order to tell itself.

[0079]The controller application 82 of said device A tries an inquiry to the controlled whole device B or the device interface of a portion. If the interface library 80 is not useful, the controller device A by transmitting a request to the device B first through a network, and receiving the XML interface of the device B to the device B, In quest of the device interface of the device B controlled directly, it can fetch from the controller device B. However, if the interface library 80 can be used, the controller device A can search for the whole device B controlled from the interface library 80, or the device interface of a portion. The software agent of HNORB acquires the XML device interface of said device B from the interface library 80, and forwards it to the controller device A.

[0080]If the XML device interface of the device B by which the controller device A was controlled once is received, the controller application of the device A will use XML parser 74 of the device A, in order to analyze and translate the device interface of the device B. And the XMLRPC codec 76 of the device A generates a desirable XMLRPC command message using a parsing result. Said XMLRPC command message is transmitted to the device B controlled through the network. If said XMLRPC command message is received, the application 84 by which the device B was controlled will use XML parser 74 of the device B, in order to analyze and translate the received XML command message. And the XMLRPC codec 76 of the device B carries out decoding of the parsing result, in order to acquire method calling information from the command message which contains the method name and parameter for a device B function in order to offer called-for service.

[0081]Since peculiar functional execution of the device B is accessed and is sent out through the peculiar interface of the device B next, XML is used for the application 84 by which the device B was controlled to the peculiar look-up table 88 and the hair drier 90 with the device B. If the response with a function or the returning value is generated, encoding of said response

or the returning value will be carried out to XML or a XMLRPC message, and it will be transmitted to the controller device A. The middleware hierarchies HNORB and IL provide for the device A by which the reference to the controlled device B was controlled, and the device A generates the remote call to a device B peculiar function like the call to a local device A peculiar function here.

[0082]Desirably, a standard XMLRPC format is used so that all the devices may explain a RPC call and decoding of them can be carried out through a network. In order to raise efficiency desirably [since the device interface of the controlled device 14 is asked by the controller device 14 and investigated], the simplified XMLRPC format which has sufficient device interface information is used. The following example shows two possible formats which call XMLRPC for OTR (One Touch Record) and TDR (Time Delayed Record) operation.

[0083]Example I:XMLRPC calls, A detailed tag and interface information. Example of a format to include: The example of a 1.OTR call :. [<?xml] version="1.0"?> <call>. <record [object>DVCR1.] </object> <method>timeDelayedRecord</method> <parameter> <parameter> <name>channel </name>. </int> <value<int>>4</value>. </parameter> <parameter>. <name>recordTime </name>. Example of <value> <time>2:10:30</time> </value> </parameter> </parameters> </call> 2.TDR call: <?xmlversion="1.0"?>. <call> <record [object>DVCR1.] </object> <method>timeDelayedRecord</method> <parameter> <name>channel </name>. <value> <channelName>NBC </channelName> -- <. /value> </parameter>. <parameter> <name>startTime</name> <value> <datetime.iso8601> 19990401T19:05:35< /datetime.iso8601 </value>>. </parameter> <parameter> <name>recordTime</name> <value><time>2:00:00</time></value> </parameter> </parameters> </call> [0084]Example II:XMLRPC calls, The tag and interface information which decreased. Example of a format which it has: The example of a 1.OTR call :. [<?xml] version="1.0"?> <call>. <object>DVCR1.record</object> <method>timeDelayedRecord</method> <parameter value="4"> channel </parameter>. <parameter. value="2:10:30":[example of >recordTime</parameter> </call> 2.TDR call] <? xml version="1.0"?> <call> <object>DVCR1.record </object>. <method>oneTouchRecord</method> <parameter value="NBC"> channel </parameter> <prametervalue="1990401T19:. 05:35">startTime</parameter> <parameter value="2:00:00">recordTime</parameter> </call> [0085]If drawing 20 is referred to, the device interface for the home device 14 is based on the database 100 which uses the standardized term and which was formed into industrial standard structure. The interface data and the term for a new interface are added to the database 100. In order to explain CE object, a comprehensive definition or database, method, and parameter which use an English word are specified in the CE database 102. A comprehensive definition or database can become C and XML which show an object, the method of each of them, and a component, or other formats.

The comprehensive definition or database which uses the standardized XML term is called a XCE definition or the database 104.

[0086]A controller and the controlled applications 82 and 84 are programmed using the standard interface subset of XML based on the XCE database 104. Each device interface is stored with said applications 82 and 84 with an XML gestalt. Even if said XCE database 104 does not need to be in XML, as mentioned above about drawing 15, said subset interface created by compile time by the embodiment of this invention will be in XML.

[0087]The information designed as 'manufacturing-company' information by drawing 20 for the embedded device 14 is built in the device 14 at the time of manufacture, and the information designed as a 'home network' is a part of-like execution time feature of a device of operation in a network. 1 for N device .... The device XML interfaces 72 designed as N are some data in the standardized XCE database 104. The home network interface library (HNIL: Home Network Interface Library) 106 provides a device interface set of the usable device 14 connected to the home network. HNIL 106 is a subset of the whole XCE database 104.

[0088]By drawing 16, a device interface is transmitted to the device B from the device A for the application B in the device B which investigates the contents of the interface for the device A. As mentioned above, a device interface is mentioned as INTERFACE-A.XML to the device A, including explanation of the object maintained by a device, and a method parameter. The device XML interface 72 is a device interface of an XML format. The contents of the XCE database 104 are the structure of a service base of providing a device interface.

[0089]If drawing 20 is referred to, said XCE database 104, The XCE interface document type definition (DTD: Document Type Definition) by which it was standardized for CE device which provides the regulation set standardized in order to use XML expressing the CE device 14 is provided. Said DTD or its subset is used for a justification check. Although the software agent designed as the manufacturing-company means 108 filters and uses the subset of the XCE definition by which it was standardized for specified CE device, For example, standardized XCE interface DTD which generates the XML device interface 72 of a CE device like INTERFACE.XML and INTERFACE.DTD is used. Said document INTERFACE.XML includes explanation of the object supported by a special device according to standardized XCE interface DTD, a method, and a parameter. Said document INTERFACE.DTD is a subset of standardized XCE interface DTD, and is used for the justification check for the XML interface of a device. It is used in order that other document type definitions may generate an INTERFACE. XML document.

[0090]The XML interface 72 of CE device containing said XML interface document and said DTD document is stored in a library like the home network interface library 106 which can generally be accessed. The software agent 110 collects the device interfaces 72 of all the devices 14 on a network which can be accessed, and arranges them to the structurized

interface library 106 which can be searched with a device name/address information. Said interface library 106 is a subset of the XCE database 104, and the process in which the interface library 106 is made is similar to reconstructing a portion or all the XCE databases 104. Said interface library 106, It can function as the cash (Cache) for which it depends on the usefulness of all the devices 14 by the home network in which a set of the device interface of all the devices in a home network or the device interface 72 most used for these days is stored. When the device 14 originates in an event like changing a disk with a DVD regenerator and updates the device interface 72, some device interfaces 72 are updated based on event service.

[0091]If drawing 21 is referred to, it has a desirable gestalt with the hierarchical device interface definition 72 of each device 14. This is because the device interface definition 72 may become long in a home device. The function of one or a small number typically like the single function for the recording by which time delay was carried out is accessed simultaneously, therefore a small portion is used for only [of said device interface 72]. It is more effective than creating the whole device interface 72 to create some device interfaces 72. By using a hierarchical device XML interface, the controller device 14, By specifying a desirable functional category or function in the demand for an XML device interface from the controller device 14 or HNORB, and IL middleware hierarchy 98, the partial device interface 72 of the controlled device 14 can be searched for. In the case of the latter, HNORB and IL middleware hierarchy 98 forward the desirable portion of the device interface 72.

[0092]If drawing 21 is referred to, said hierarchical device interface structure, (1) Now a useful device. The 1st hierarchy 112 for the written-in XML interface of each home network, and (2) The 2nd hierarchy 114 for the general XML interface of each device which wrote in the functional category, and (3) The XML interface of each functional category for a device. The 3rd hierarchy 116 for specifying, and (4) Four layers including the 4th hierarchy 118 for standardizing the XML interface of each function in a functional category are included. Inside a home network, the three lower layers 114, 116, and 118 are merely used, and 112 [layer / 1st] is used in the home network exterior.

[0093]Drawing 22 shows said layers 112, 114, 116, and 118 and the corresponding example of an interface. The interface in each hierarchy is linked to a higher rank or a lower layer through the X link which provides a both-directions link, or a link like X pointer (if it can do). An X link is (1). The X link ingredient and (2) which make the link in an XML document recognize as a link The package of the hyper-linking functionality which has two parts of X pointer ingredient which carries out addressing of the link to the exact subpart of an XML document is included. Therefore, although an X link manages how a link is inserted in an XML document, said link shows data like a GIF file here. Furthermore, even from where, X pointer determines the fragment identifier (Fragment Identifier) which can go to URL, when linked to an XML

document (from an HTML file).
[0094]With the typical command and control model for the server device 14 which controls other server devices 14 concerning this invention, the 1st device 14 is tried so that the device interface of the 2nd device 14 may be asked on the 2nd interface hierarchy 114. After choosing a functional category (FC: Function Category), said 1st device 14 asks the interface hierarchy 116 of a specific functional category with the 2nd device 14 like a recording category. Said 1st device 14 asks the interface hierarchy 118 a specific function like OTR or TDR, in order to make the call to said function. As a hierarchical or interface function with a more effective tree structure is looked for, network band width is contracted. It is as interface file structure and the example of a layer being the following.
4th layer of 3rd layer of 2nd layer of 1st layer 112-HN1.xmlXML114-VCR1.xml116-VCR1_RecordCategory.xml118-VCR1_RecordCategory_OTR.xml [0095]Similar, the home network interface library 106 is hierarchical, and can be structurized by various methods by other service types of a device, or other positions like a room. Said hierarchical structure is an interface of other home networks or the local home network 10 to the Internet.
[0096]The hierarchical device interface definition 72 is shown below by the illustration target embodied by the XML syntax (Syntax).
consumer (document_file, doc). + ---- document_file<server_home.dtd and server_auto.dtd>+ ---- doc () [services_home, server_auto, server_samsung_web_site and] avc_commands and cal_commands, + ----services_home (xml_utility,client,server_av,lighting,comms,hvac,utility,security,appliances,convenience, + ---- xml_utility. (download_DTD_file). + ---- client (acknowledge, attention, error, post_message, sound, stop_schedule, stop_all)+---- sound (alarm, ring, buzz). + ---- server_av (controls_gen, source, sink)+ ---- controls_gen (p ping) rocess_infor and setup, + ---- process_info (second/w_id, h/w_id)+ ---- h/w_id (ser_no, manuf, model, class)+ ---- s/w_id (ser_no, exe_name, version). + ---- setup (clock). + ---- clock. (hours, minutes, seconds). + ---- source. (service_id, media, rate, protocol, stream_format, controls_av)+ ---- sink () [service_id, media rate, protocol, stream_format and] controls_av, + ---- service_id (url)+ ---- media (tpt_stream, ram, disk, tape)+ ---- disk (name, number). + ---- rate<value>+ ---- protocol (61883/1394, UDP/IP/Ethernet)+ ---- 61883/1394 (isoch_.) ch_no + ---- stream_format () [video and] audio, + ---- video. (dv, mpeg2tpt, dsstpt, mpeg2pes, mpeg10801-tpt)+ ---- audio (mpeg3, ac-3, midi) +controls_av () [flow_control, tune timer_record and] ui_control, + ---- timer_record (tune, flow_control)+ ---- flow control (play, stop, goto, record)+ ---- play (time_params). + ---- record (time_params). ---- + time_params (now, start, duration, end)+ ---- tune (send_epg, channel)+ ---- channel (number, id, time_params). + ---- ui_control (display, acoustic)+ ---- display (brightness, contrast, color/tint, horiz_size, vert_size)+ ---- ac. oustic (volumn, base, treble, balance, fade)+ ---- lighting (sensors, lights, send_epg)+ ---- sensors (living_room, sky). + ----

lights (rooms_up, rooms_down, yard)+ ---- rooms_up (bed1, bed2, bed3, bed4)+ ---- bed1 (lamp, dimmer). rooms_down (family, kitchen, living, dining, soho, garage)+ --- + dimmer<value>+ ----. -----. yard (front, back)+ ---- comms (homehub, intercom, telco)+ ---- homehub (send_device_list, send_configuration, sene_snmp_mib). controls_ ---- + intercom()+ ---- telco()+ ---- hvac (controls_gen, controls_havc)+ ----. hvac. (a/c, heat, temp, humidity). + ---- temp (low, high, hysteresis)+ ---- utility (meters, energy_mgmt)+ ---- meters (water, gas, electric). + ---- water<value>, gas<value>, and electric<value>+ ---- security (sensors, send_epg, alarm)+ ---- sensors () [peripheral, motion and] + ---- peripheral. (rooms_up, rooms_down). + ---- motion. (room_down, yard) + ---- appliances (microwave, range, oven, fridge, freezer, coffee, toaster, washer, dryer, water_heater). + ---- microwave (send_epg, controls)+ ---- fridge (temp)+ ---- water_heater (temp)+ ---. - convenience (window, curtain_open, door/gate, pool/spa, bath, fountain, lift, jacuzzi)+----curtain_open<value>. + ---- server_auto (message, server_auto_ford_explorer_98)+----server_auto_ford_explorer_98 (mileage, maintenance). + ---- mileage<data>. + ---- maintenance<data>. + ---- server_samsung_web_site(message, service, help)+ ---- avc_commands -- < -- command_string and >+---- service_id (url). +cal_commands<,,,command_string,,,> +---- service_id(url,, [0097]Said hierarchical device interface definition 72 includes the following fields.

'document file' and this provide the name of the regulation (DTD) file of the document type used by the XML parser for verification of the justification of the version portion of the XCE database 104 or the XCE database 104, and correction. Being able to consider various DTD files for the portion into which said XCE structure is different, said DTD differs from INTERFACE.DTD for the document type definition for RPC.CALL, and communication here.

'doc' and this provide compatibility, the characteristic, communication, and the highest level name of the field of a control interface.

'Services_home' and this provide the field for home automation, electric appliances, and use nature.

'Server_auto' and this show the useful message interface over one set or the automobile type beyond it to the car in a car barn. For example, 'server_auto_ford_explorer_98' is an interface to a specific car. This enables it to access the mileage and maintenance interface of a car, and the car manufactuing company or car barn checked directly is used by a direct check or the remote access which carries out the telediagnosis.

'server_samsung_web_site' and this communicate with the manufacturing-company website of the home exterior, and include the interface for a message, service, assistance, etc.

'AVC_commands' and 'CAL_commands', and this can interpret AV/C and a CAL language -- it succeeds -- a device is provided. This structure part checks a command in said language, and a command is added by XML or is performed. Therefore, as for said item, the protocol

converter application for XCE (Web) is used as an interface to original CAL or AV/C application software.

[0098]As mentioned above, 'Services_home' provides the main structure containing A/V electric appliances. Said a part of structure is extended in detail to a video service sink and a stream destination (for example, DVCR) control interface as a specific example. : in which a control interface contains the next by a typical home network -- 'xml_utility'. This provides the details matter for supporting a support utility network function like carrying out downloading of the DTD file, interface file, and program file which were updated.

'client' and this explain the interface details matter of the client device 12 containing a web browser. For example, 'acknowledgment' displays attestation consent of a controller with the shipped message or command.

'server_av' and this provide control and a capacity interface to all the useful audios and video services containing STB, DVCR, DTV, DVD, AUDIO, etc.

'lighting' and this provide a home automation lighting control machine with an interface, and include a sensor, lighting, etc.

'comms' and this provide a communication device with a control interface, in order to restore the remote management or composition of the set rise of the purpose of use or a device, or a component typically.

'hvac' and this are used in order to provide the interface for remote control of a HVAC system, for example, to erase a domestic HVAC system during the peak load of the day and to control said system by a utility plant company (Utility company) from the home exterior. By the device for the device based on the controller which provides a control mechanism still more complicated than automatic-temperature-adjustment device control, said interface may be used in order to control a HVAC system from the inside of a home.

'utility' and this provide the interface for reading the measuring instrument for a home.

'security' and this provide the interface for a security sensor and alarm setting. Therefore, interface use and the application advance can access the sensor and sensor around a home for the surveillance of the device, and control on a home network device.

'appliances' and this provide the interface for the kitchen and the useful and common home device which include other control and a component from remote control, temperature setting perception, or a controller device. In one scenario, the microwave oven can scan the bar code information on a cooking item package, and in order to know the cooking time of cooking to the given microwave oven system type, it can access a manufacturer database. Integration of the device which uses a device device command and control provides many control scenarios, in order to provide service like stopping a dishwasher automatically and carrying out mute (Muting) of the television, when a telephone call is answered in a kitchen or sitting room.

'convenience' and this provide the interface to a device, in order to provide expedient service

like the interface to a curtain, a window, a blind, or a wash controller.
[0099]By the aforementioned explanation, to the A/V device which provides A/V service, 'server_av' is a part of structure for a control interface, and is divided into 'controls-gen', 'source', and 'sink' performance again.
'controls-gen' provides the interface for general utility interfacing like the ping (Ping) test which tests a device fabrication person attribute and device existence. Software, a hardware check, and a fabrication property like version information are included. The device which provides said interface returns the data which provides the name or check to said software without bringing about any control actions. The interface which sets the time of a day clock is included.

'sink' provides the interface for a media stream service device. The structure is the composition based on the service (for example, video stream recording and playback) provided rather than a special device name like VCR. For example, a tuner and a DVD player are video program stream sauce which has both of video program formats to a network, and are controlled like a start and a stop. The address of the difference in specific device control is done by the lower hierarchy of a structure definition.
'source' provides an interface similar to the 'sink' interface.
[0100]If the contents mentioned above are referred to, 'service_id' or 'application_interface_id' includes the URL position of a name, an address, a web address, or one or more devices. Since the XCE database 104 constitutes the whole on which it has agreed to an interface, Usually, a DHCP (Dynamic Host Configuration Protocol) software agent assigns an address and a default name to each device, and said address and a default name are added to service or the interface of a device. And in order that the software agent 110 may generate 'a partial XCE network (Network partial XCE)', The device interfaces 72 which contain a subset or 'a partial XCE device (Device partial XCE)' from all the devices locally connected to the home network are collected. An additional related external interface is added to the structure for external control. For example, 'service_id' may be the name/address in the received structure which includes subscription from a software agent with the device interface of the device connected to the network, or the network interface library 106. Then, the user can search service with a database and can access the application which contains the specific data part of a library using said name/address. Therefore, the network can include the same multiplex service identified by said name/address information.
'media' and this provide the interface for the media type containing the disk and tape for the transmission stream from a tuner, RAM from PC DRAM, DC, or DVD. Said media are named and checked and the controller device can search the XCE database which checks the general media provided on a network. When new media like a DVD disk are provided on a network, some device interfaces 72 which check program data on a disk are changed into conformity.

Therefore, the whole device interface 72 does not need to be transmitted and the portion for which it was merely suitable is transmitted to a XCE database. By reception of an attention signal, the library software agent 110 can fetch new updating, and is located in it by the place for which it was suitable. Addition of a disk medium is similar to adding service to said network or connecting other devices to said network.

'rate' and this provide the value to the data stream rate for a device interface like for example, 6 Mbits/Sec or 19.2 Mbits/Sec.

'protocol' and this check the protocol used for said data stream. For example, a desirable protocol will be chosen if 61883/1394 or U is provided with one or more protocols like /IP.

'stream_format' and this provide the packet format and/or compression standard for the Digital Stream audio and video division. If one or more formats are provided, a desirable format will be chosen through an interface message. The format which can determine whether the controller application 82 has an interexchangeable format can be investigated.

'controls_av' and this provide the main control interface for an A/V media device.

'Flow_control' and this are the methods for a specific device, and provide data stream control like PLAY, STOP, GOTO, and RECORD. The method does not change to the device (Embedded) embedded, for example except for PC software. The tkdrl control can include a time component for the delayed operation.

'Tuning' and this provide the interface for tuning control. The controller device 14 can ask for the reply of the electronic program guide (EPG: Electronic Program Guide) data structure mentioned above by the interface of the controlled device 14.

'UIcontrol' and this provide with a control interface the application 84 controlled in order to control correction like the volume to the luminosity and the contrast, and the audio to a display, and a base.

'Timer_record' and this provide the interface for a set updater to the controller application 82, in order to embody the delayed time record. Direct channel alignment information and flow control (time_aparams) information are used.

[0101]The aforementioned explanation is identically applicable to the client device 12. Other syntax XCE definitions for CE field or a database is used. An alternative plan syntax XCE database includes all the service explanation which includes home automation, a device, and a car, for example. When it provides adaptability and a parameter for control of a service object, the control method is used in order to control said object as hope. The example of a command is shown below with AV/C and the CAL instruction word containing a binary number or a hexadecimal number data row.

consumer (document_file, doc). + ---- document_file<server_home.dtd and server_auto.dtd>+---doc(avec_commands,cal_commands,services_home,server_auto,)server_ auto, server_samsung_web_site, server_auto_ford_explorer_98, and +----

avc_commands<...command_string...>. + ---- call_commands -- < ... command_string ... >+ ---- services_home () [client, av, lighting, comms, hvac, utility, security, appliance and] convenience, + ---- xml_utility (download_DTD_files)+ ---- client (acknowledge, attention, error, post_schedule, and soundstop_schedule -- st.) op_all, + ---- sound. (alarm, ring, buzz). + ---- server_av (source, sink). + ---- soruce. (service_id, media, rate, protocol, stream_format, controls_gen, controls_av) + ---- sink () [service_id, media rate, protocol and] stream_format and controls, + ---- service_id (url). + ---- media. (tpt_stream, ram, disk, tape). + ---- [+ ---- 61883/1394 (isoch_ch_no).] disk(name, number)+ ---- rate<value>+ ---- protocol (61883/1394, UDP/IP/Ethernet) + ---- stream_format (video, audio)+ ---- video (dv, mpeg2tpt, dsstpt, mpeg2pes, mepeg1080 i-tpt)+ ---- audio (mp.) eg3, ac-3, and midi, ---- + control_gen (ping, process_info, setup)+ ---- controls_av (flow_control, tune, timer_record, ui_control). + ---- process_info (second/w_id, h/w_id)+ ---- h/w_id (ser_no, manuf, model, class)+ ---- s/w_id (ser_no, exe_name, version). + ---- setup (clock). + ---- clock (hours, minutes, seconds)+ ---- time_record (tune, flow_control)+ ---- flow_control (play, stop, goto, record). + ---- play (time_params). ---- + record (time_params)+ ---- tune (send_epg, channel)+ ---- channel (number, id, time_params)+ ---- time_param. s (now, start, duration, end). ---- + ui_control (display, acoustic)+ ---- display (brightness, contrast, color/tint, horiz_size, vert_size). + ---- acoustic(volume, bass, treble, balance, fade)+ ---- lighting () [screen, light and] send_epg + ---- sensors (living_room, sky)+ ---- lights (rooms_up, rooms_down, yard)+ ---- rooms_up (bed1, bed2, bed3, bed4). ---- + rooms_down (family, kitchen, living, dining, soho, garage)+ ---- yard (front, back)+ ---- bed1 (lamp, dimmer). + ---- dimmer<value>+ ---- comms (netman, intercom, telco)+ ---- netman (send_device_list, send_configuration, send_snmp_mib). + ---- intercom()+ ---- telco(). + ---- havc (controls_gen, controls_hvac)+ ---- controls_hvac (a/c, heat, temp, humidity)+ ---- temp (low, high, hysteresis). + ---- uti. lity (meters, energy_mgmt). + ---- meters (water, gas, electric)+ ---- water<value>, gas<value>, and electric<value>+ ---- security (sensors, send_epg, alram). + ---- sensors (peripheral, motion)+ ---- peripheral (rooms_up, rooms_down)+ ---- motion (rooms_up, yard). + ---- appliances. (microwave, range, over, fridge, freezer, coffee, toaster, washer, dryer, water-heater) + ---- microwave (send_epg, controls). + ---- fridge(temp)+ ---- water_heater (temp)+ ---- convenience () [window, curtain_open, door/gate, pool/spa bath, fountain, lift and]) +----curtain_open<value> +----server_auto (message,mileage,maintenance,,) +----mileage<data> +----maintenance<data> [0102]In other viewpoints, this invention provides use of the instruction word embodiment which exists in a network for a device device command and control. A device has API which generates a binary number sequence at the time of execution according to the existing transmission mechanism for an inside. In such a case, in order to provide the device 14 of further others with an XML remote procedure call (XMLRPC: XML Remote Procedure Calls) from the one device 14 in a network, The existing application interface embodiment is exchanged by the call to XML

service API. Therefore, original embodiment is equivalent to the trumpet (Wrapper) for XML service API. Drawing 18 shows the application generated as interface embodiment exchanged by the trumpet by XCE/XML service API again using CAL in a dotted line, or other instruction words like AV/C. The example which changes a XMLRPC format from a CAL instruction word is shown below.

---------- existing implementation:void. DeviceCALCommand (int.) command{x. x /* create CAL formatted byte string to represent this object/method and output to the wire */ CreateCALFormattedByteStrin g (command); /* different forevery protocol*/ SendCALByteString(); */different for every protocol*/} ---------- ---------- wrapping the XML Service. API. call: void DeviceCALCommand(int command){{/* replace CAL implementation with calls to the XMLServiceAPI */ CreateXMLMessage(command; /* always the same */ sendXMLMessage (); /* always the same */} [0103]In the viewpoint of further others, if drawing 23 is referred to, this invention provides the standard instruction protocol for communication between devices between the devices of the others in a network, and control language translation. It should be the format as which said information can interpret a request device for other devices which share information. And in order that the one device 120 may control other devices 22, said two devices should use the common language. in order to interpret a mutual command. This invention provides the common discernment format for data, and a command protocol.

[0104]By one embodiment, common display or data, and the method of carrying out a command protocol package are provided, and, thereby, the receiving device 122 can determine the format of original of the transmitted data. Supposing a receiving device can interpret an original format, the direct reception of the data can be then carried out. Otherwise, the receiving device 122 can ask for the application which transforms data into the desirable format which can interpret the translation device 124 or the request device 122. Said translation device 124 or application transmits the data which determined the format of original of the original data, translated said data in said format searched for, and was translated into the request device 122.

[0105]Next, said request device 122 processes data, as said data was completely provided in the language format of original of a request device by the transmission device 120 from the first. Said request device 122 can transmit a response to the transmission device 120 by a proxy again through the application which sends a reply or is translated in the original format of the translation device 124 or the transmission device 120 in the format of original of a request device. Said translation method is used for the information containing a command protocol, a data file, and an audio/video stream.

[0106]For the device which does not use the compatible format mentioned above, this invention provides translation of the data which contains the command protocol from /to a hard

(Non-compliant) device. For example, when the hard device 120 transmits data to the flexible device 122, said flexible device 122 can translate data based on the determination of an original format of said data. For example, said flexible device 122 can investigate the data for the specific bit pattern inside data. When a flexible device transmits data to a known hard device, before transmitting said flexible device based on the determination of an original format of a hard device, it can translate said data.

[0107]Illustration embodiment may be for the home network which supports IP and an HTTP protocol. Said home network is connected to the Internet in order to obtain the application for a desirable function, and service various type. Therefore, the compatible format method is made so that it may have the Internet Protocol and the procedure over operation, and compatibility on the Internet and a home network.

[0108]An example which provides a common data format is using XML which generates the data package for transmission through a home network. Said data contains a command protocol, an audio or a video stream, graphics, or application. Said data is wrapped by the standard header which checks the format of original of data, and the item of a package with an XML gestalt. Said header checks the data part of a data type and the XML code to only, said data is translated by it if needed and application suitable after reception is provided with it.

[0109]Under a web standard, said confirmation work is performed by the browser which uses file name extension, in order to check the type and item of file transmission. Next, a browser moves the module of a suitable plug which processes the file. By a home network, XML is used in order to check the data communications which provide all the home network transmissions on IP by the common check method mentioned above.

[0110]The software hierarchy who, on the other hand, checks the item of all the data communications through a home network to only is provided by a home network protocol stack. Said software layer is used instead of XML. The compatible format and check principle of this invention are identically applied to said software hierarchy as the embodiment which uses XML, or the check method.

[0111]If data package transmission is received by drawing 23, the receiving device 122 will investigate the XML check header of the data package which determines the format of the data in it. If said data is the format which can be recognized with the device 122, XML check header information will be thrown away and said device will process data directly. Otherwise, said device 122 changes the received XML package into an XML translation request package, and transmits a request package and said data to the translation server device 124.

[0112]Said translation server device 124 translates said data, and changes said translated data into an XML translation response package. Next, said translation server 124 forwards a response package to the request device 122. In a translation error, said translation server 124 can provide a translation response error condition at the request device 122. If the translated

data is received, said request device 122 will process the translated data with a response package.

[0113]the example of an XML data package or a packet is as follows : <IDENTITY type=format=AV/c> ... packet data ... the example of a </IDENTITY> translation request package or a packet is as follows. : . <TRANSLATION REQUEST. type=Command format=CAL>. <IDENTITY type=Command. format=AV/C> ... packet. A data </IDENTITY> </TRANSLATION REQUEST> translation request package or the example of a packet is as follows. : <TRANSLATION RESPONSE type=Command. format=CAL> ... packet. data </TRANSLATION RESPONSE>. The example of a transmission response error condition package or a packet is as follows. : <TRANSLATION RESPONSE type=Command format=CAL> ... packet data ... <ERROR. condition=Unrecognized command>Transla. tion could not be performed</ERROR> </TRANSLATION RESPONXE> [0114]The table 3 includes a package or a packet type, and the partial list of formats by drawing 24.

[0115]In order to provide translation service, the translation server 124 is checked in a network between network composition by a method similar to the method of a DHCP server. Said translation server 124 broadcasts the IP address to all the devices in the back fixed time network with which the network was constituted. Translation service and all the devices 120 and 122 which can carry out compatibility store the IP address of the translation server 124 broadcast through a network, while carrying out booting of the network.

[0116]On the other hand, the request device 122 can broadcast a translation request through a home network. All the translation servers 124 which receive a translation request in a network can answer a translation request by transmitting a translation response to the request device 122. Next, the request device 122 chooses the one translation server 124 in a response translation server. As an example, the request device 122 chooses the first translation server 124 that answers a translation request. In other examples, for selection of the translation server 124 which fills a translation request, the translation server 124 is between them the very thing, and it can be negotiated for it with/or the request device 122.

[0117]By the embodiment of further others of this invention, in order that the multiplex translation server 124 may perform all the translation requests, it is used. For example, the single translation server 124 may not have the performance which translates all the requests. In this case, it is necessary to check the type of the translation service which can provide the address of each translation server, and each translation server. Each devices 120 and 122 can store all the translation server IP address lists, the list which ****s in the translation service type which each translation server 124 provides, and the selectively related translation application.

[0118]If you wish to transmit data to the receiving device 122 known as the transmission device 120 uses a format originally different from transmission device 120 format for efficiency,

Said transmission device 120 can transmit data to the receiving device 122 by the proxy which led the translation server 124. Said transmission device 120 includes the address of the receiving device 122 as a destination to the data which transmitted the command to the translation server 124 and was translated into a transmission request command and resemblance at the translation server 124.

[0119]When the receiving device 122 requires translation of a data stream, the transmission device 120 can carry out routing of the data stream to the direct translation server 124, and said translation server 124 transmits the data translated into the receiving device 122 as it was mentioned above one by one. In other one side, said transmission device 120 can transmit a data stream to said receiving device 122, and next, in order that the receiving device 122 may forward the data translated into translation and said receiving device 122, it carries out routing of the data stream to the translation server 124.

[0120]It is under explanation, and a control mechanism is distributed and is based on HTTP1.1 which provides the application level protocol for a cooperative hypermedia information system. In the broad use for many tasks, HTTP is common and is a protocol of a for [state / (stateless) / non-/ objects]. The feature of HTTP is a classification and negotiation of the transmitted data and the data representation which a system comprises independently. Desirably, the network protocol used by a device and application on the home network is IP (Internet Protocol). However, other protocols are used.

[0121]Other modification is possible although this invention was explained in detail by the desirable embodiment. Therefore, a claim must not be limited by the desirable embodiment of this invention.

[Brief Description of the Drawings]

[Drawing 1]It is a block diagram for the embodiment of the network concerning the 1st viewpoint of this invention.

[Drawing 2]It is a block diagram of drawing 1 concerning a 1st embodiment of device control and outline corresponding.

[Drawing 3]It is a block diagram showing a 1st embodiment to the home network system concerning this invention containing many clients and server devices.

[Drawing 4]It is a block diagram showing the client device of drawing 3, and a 1st embodiment of server device embodiment.

[Drawing 5]It is a drawing in which a 1st embodiment of client device embodiment is shown.

[Drawing 6]It is a drawing in which a 1st embodiment of server device embodiment is shown.

[Drawing 7]It is a block diagram showing mutually a 2nd embodiment of the network server device which enables communication and control.

[Drawing 8]It is a block diagram showing a 1st embodiment to the structure of the audio / video model which contains a sauce server device, a sink server device, and a client device in a

network.
[Drawing 9]It is a drawing in which other embodiments of an audio / video model are shown.
[Drawing 10]It is a drawing in which the embodiment of the performance data table for a network device is shown.
[Drawing 11]Drawing 11 is a drawing in which the embodiment of the characteristic data table for a network device is shown.
[Drawing 12]It is a drawing in which the composition of a 1st embodiment to the building block which generates a command message between network devices is shown.
[Drawing 13]It is a drawing in which the composition of other embodiments of the building block concerning drawing 12 which generates a command message is shown.
[Drawing 14]It is a drawing in which a 3rd embodiment of an interaction is shown between a network client and a server device.
[Drawing 15]It is a block diagram of a 1st embodiment that defines API extension of a network device interface.
[Drawing 16]It is a drawing in which the structure of a 1st embodiment for the server device application which accesses the interface explanatory note document of other server devices is shown.
[Drawing 17]It is a drawing in which other embodiments of the internal-device control structure between a controller server device and the controlled server device are shown.
[Drawing 18]It is a drawing in which the embodiment of an XML protocol which provides a web standard common middleware hierarchy by a communications stack on the API level between network devices is shown.
[Drawing 19]It is a drawing in which other embodiment of the instruction control structure between server devices again is shown.
[Drawing 20]It is a drawing in which the relation between a device interface library and the electric appliance database for a home device is shown.
[Drawing 21]It is a drawing in which the embodiment of a hierarchical gestalt to a device interface definition is shown.
[Drawing 22]It is a drawing in which a hierarchy's 1st embodiment is shown by the device interface definition of drawing 21.
[Drawing 23]It is a drawing in which common transmission and an interpretation procedure are shown between a transmitter and a receiver device.
[Drawing 24]It is a drawing in which the packet type for providing the translation service concerning the 1st viewpoint of this invention and a 1st embodiment of the partial list table of a format are shown.
[Description of Notations]
10 Network 12 The client device 14. The server device 16 communication-link 18GUI display

20. Server control program 22 graphic controlled object (GCO) user interface description 24 client-device renderer 26 control-state-data 28 clock 30 instruction-word interface 32 The data stream sauce hardware 34. The data stream sink hardware 36. Session management person 40 The functional standard block 42 of service. The block 44 with which a message element is constituted. Industrial standardization format block 46 message compressed block 48 message-character-string configuration block 50 Software client control programs 52, 54, 58, and 60 Blocks 56 and 62 The look rise table 64. The library device 66 communications stack 68. Request broker 80 for XML layer OUT70 XML layer IN72 XML interface 74 XML-parser 76 XMLRPC codec 78 interface Fetscher 79 home network The home network interface library 82. the controller application program code 84 -- an application -- KESHI. the YOMPU log rum code 86 home-network device web server 88 -- peculiar -- the look-up table 90 hair-drier 92 hardware service 94 -- the peculiar interface 96 -- the 3rd device 98 -- middleware hierarchy 100. Database 102 CE database 104 XCE database 106 home-network interface library 108 manufacturing-company means 112,114,116,118 hierarchy 120 transmission-device 122 request device 124 Translation device

[Translation done.]

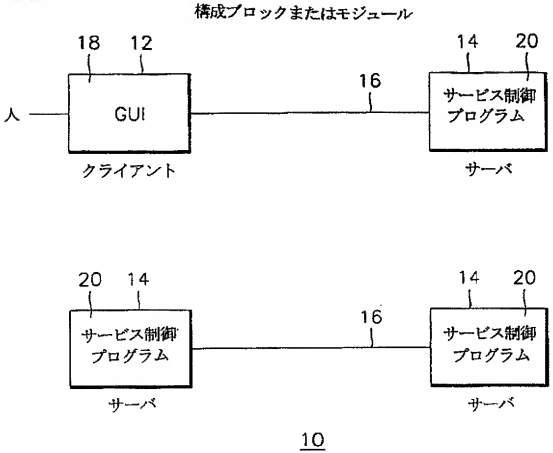
* NOTICES *

JPO and INPIT are not responsible for any
damages caused by the use of this translation.

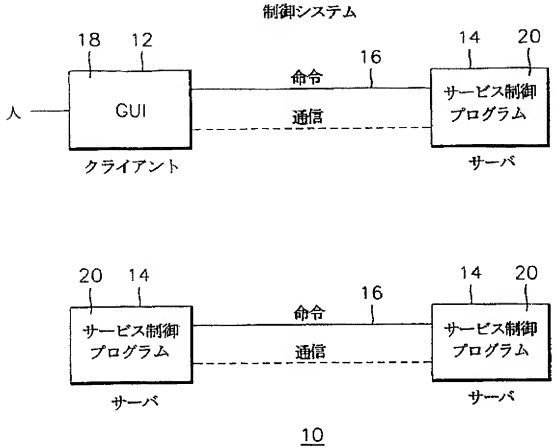
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

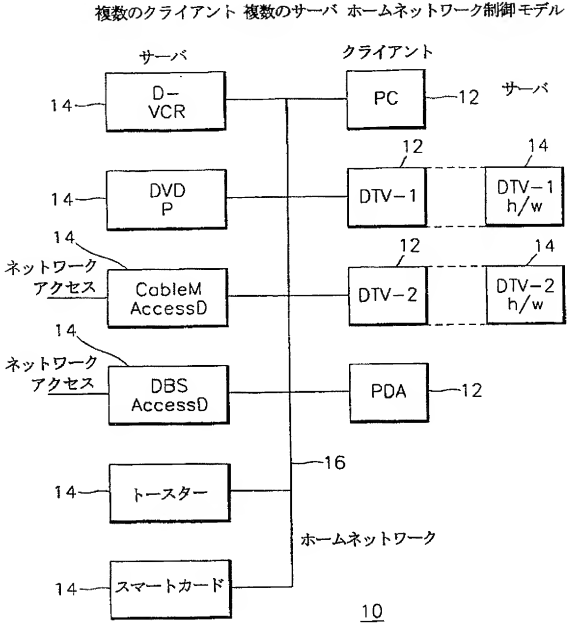
[Drawing 1]



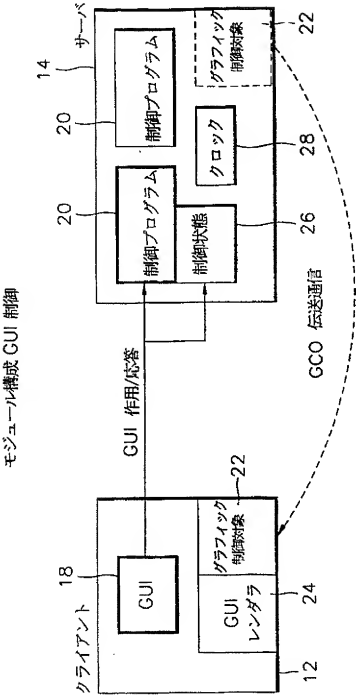
[Drawing 2]


制御システム
18
12
16
14
20
命令
人
GUI
通信
サービス制御
プログラム
クライアント
サーバ
20
14
16
14
20
命令
サービス制御
プログラム
通信
サービス制御
プログラム
サーバ
サーバ
10

[Drawing 3]

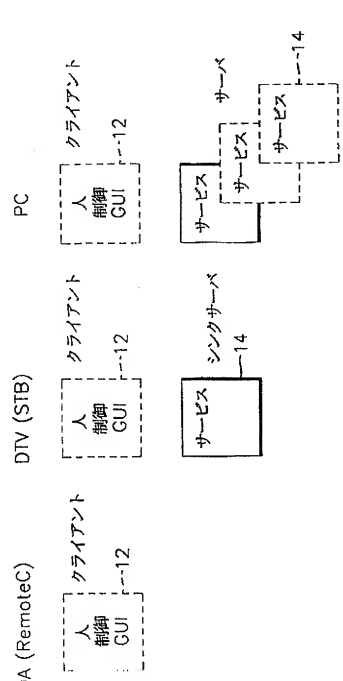

複数のクライアント 複数のサーバ ホームネットワーク制御モデル
サーバ
クライアント
D−
VCR
14
PC
12
サーバ
12
14
DVD
P
14
DTV−1
DTV−1
h/w
14
ネットワーク
アクセス
CableM
AccessD
DTV−2
DTV−2
h/w
ネットワーク
アクセス
DBS
AccessD
PDA
12
16
トースター
ホームネットワーク
スマートカード
10

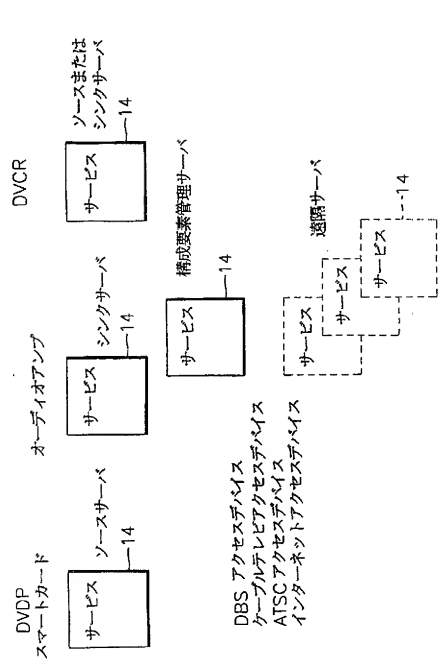
[Drawing 4]


モジュール構成 GUI 制御
クライアント
18
GUI
GUI レンダラ
24
グラフィック制御対象
22
12
GUI 作用/応答
GCO 伝送通信
サーバ
14
20
制御プログラム
制御状態
26
20
制御プログラム
クロック
28
グラフィック制御対象
22

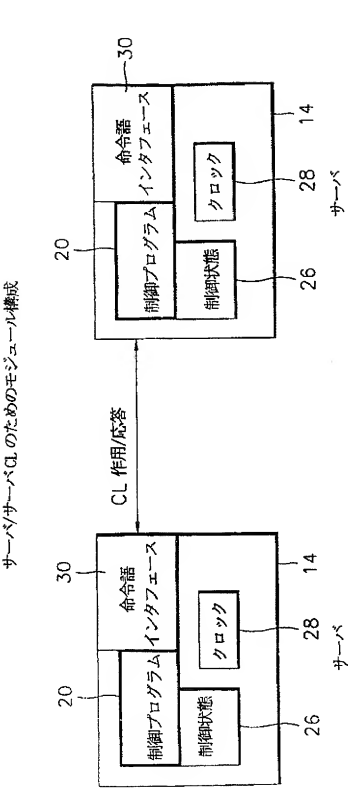
[Drawing 5]

[Drawing 6]

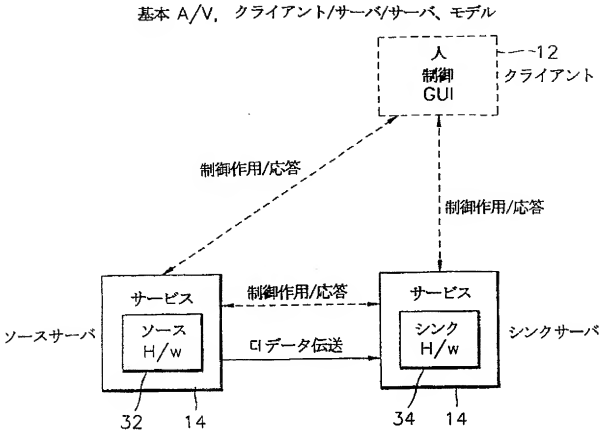

クライアントの構成要素
PDA (RemoteC)
DTV (STB)
PC
クライアント
人制御GUI
12
クライアント
人制御GUI
12
クライアント
人制御GUI
12
サービス
シンクサーバ
14
サービス
サーバ
サービス
サービス
14


サーバの構成要素 (Boxes)
DVDP
スマートカード
オーディオアンプ
DVCR
サービス
ソースサーバ
14
サービス
シンクサーバ
14
サービス
ソースまたは
シンクサーバ
14
DBS アクセスデバイス
ケーブルテレビアクセスデバイス
ATSC アクセスデバイス
インターネットアクセスデバイス
サービス
構成要素管理サーバ
14
サービス
遠隔サーバ
サービス
14

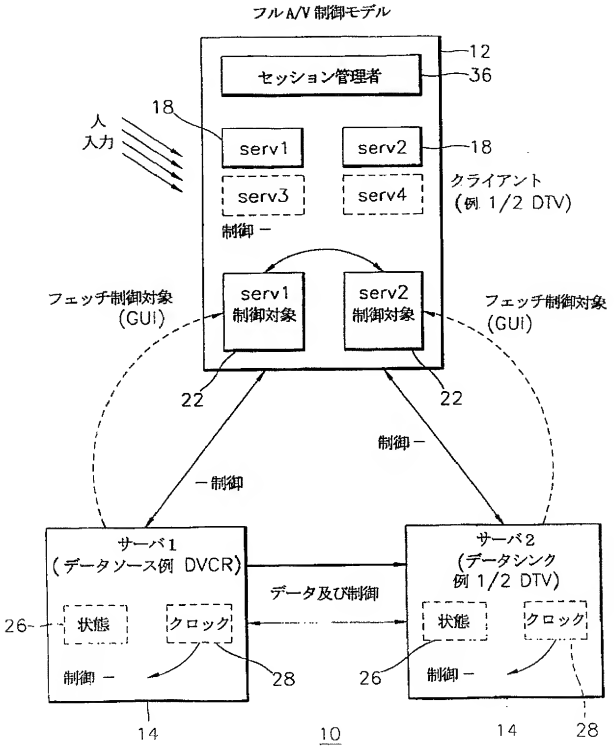
[Drawing 7]


サーバ/サーバCL のためのモジュール構成
CL 作用/応答
20
30
命令語インタフェース
制御プログラム
制御状態
クロック
26
28
14
サーバ

[Drawing 8]


基本 A/V, クライアント/サーバ/サーバ、モデル
人
制御
GUI
12
クライアント
制御作用/応答
制御作用/応答
サービス
ソース
H/w
制御作用/応答
データ伝送
サービス
シンク
H/w
ソースサーバ
シンクサーバ
32
14
34
14

[Drawing 9]


フルA/V制御モデル
12
セッション管理者
36
18
人
入力
serv1
serv2
18
serv3
serv4
クライアント
(例 1/2 DTV)
制御－
フェッチ制御対象
(GUI)
serv1
制御対象
serv2
制御対象
フェッチ制御対象
(GUI)
22
22
制御－
－制御
サーバ1
(データソース例 DVCR)
サーバ2
(データシンク
例 1/2 DTV)
データ及び制御
26
状態
クロック
状態
クロック
制御－
28
26
制御－
14
10
14
28

[Drawing 10]

テーブル１： 性能テーブル

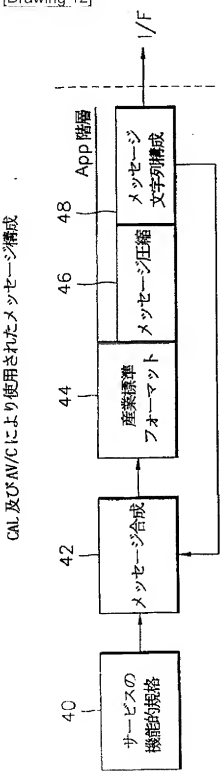
Service	Sink/Source
Service A	Sink
Service B	Source
Service C	Source
Service D	Sink

[Drawing 11]

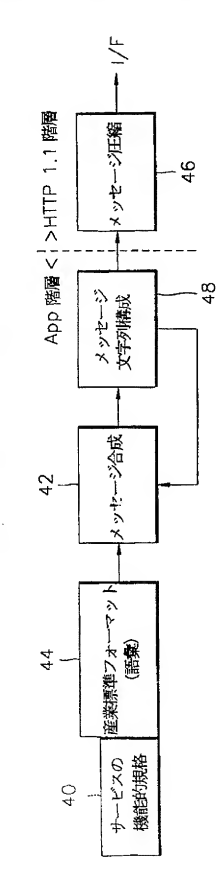
テーブル２：特性テーブル

名称	長さ	値
DeviceManufacturer	20 chars	Device manufacturer's name
ManufacturerURL	60 chars	device manufacturer's home page URL
manufacturerIcon	20 chars	Name of Device manufacturer's Icon
DeviceName	30 chars	Device name
DeviceModel	20 chars	Device model number
DeviceType	20 chars	device category
DeviceLocation	30 chars	device group or location
DefaultSource	15 chars	Data type, Default source device (IP address)
DefaultSink	15 chars	Data type, Default sink device (IP address)
DeviceIcon	20 chars	Name of device icon

[Drawing 12]

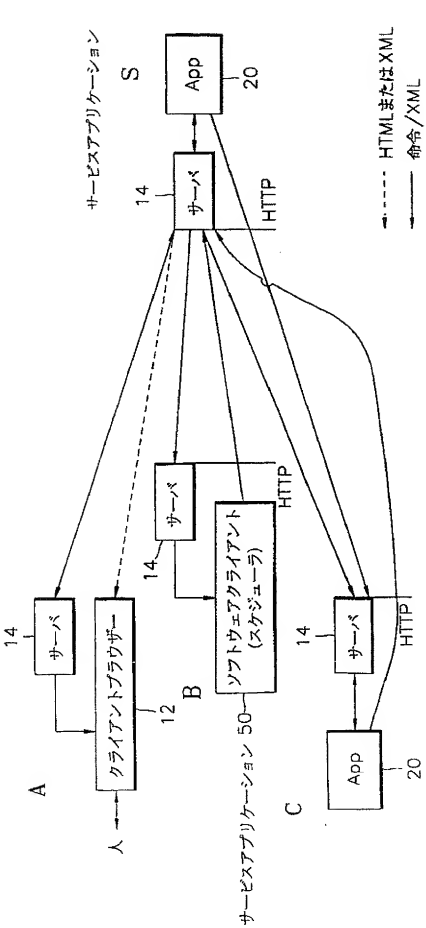


[Drawing 13]

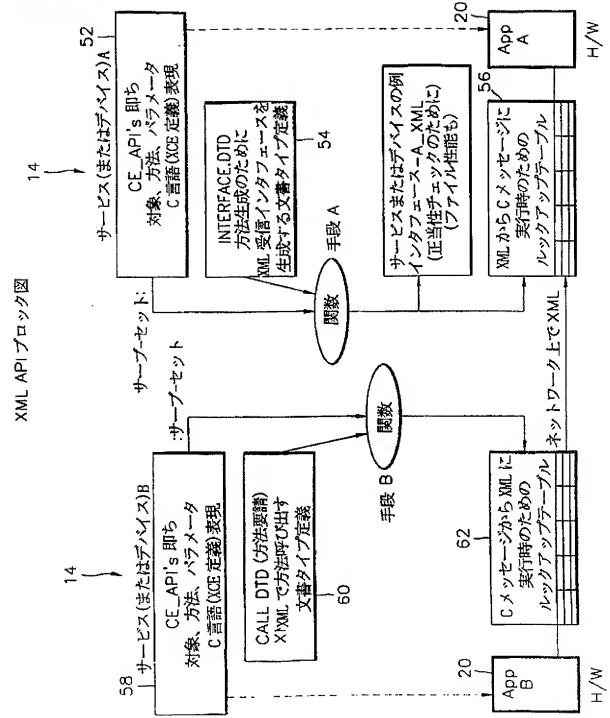

新たなXCE/XMLのメッセージ構成
40
サービスの機能的規格
44
産業標準フォーマット(語彙)
42
メッセージ合成
App 階層
48
メッセージ文字列構成
>HTTP 1.1 階層
46
メッセージ圧縮
I/F

[Drawing 14]

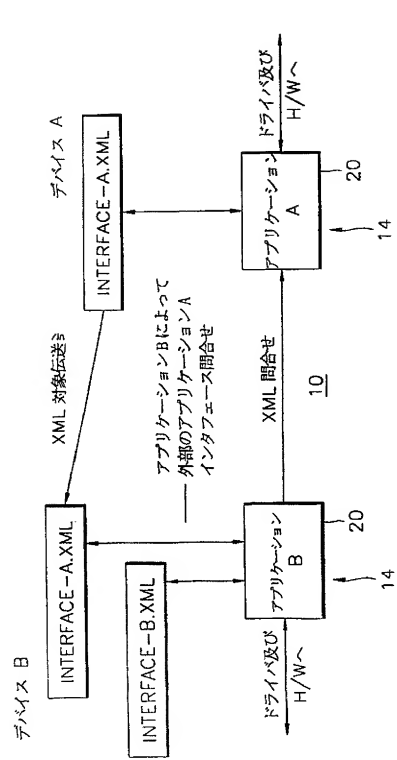
Web及びXMLを使用するクライアントサーバモデル



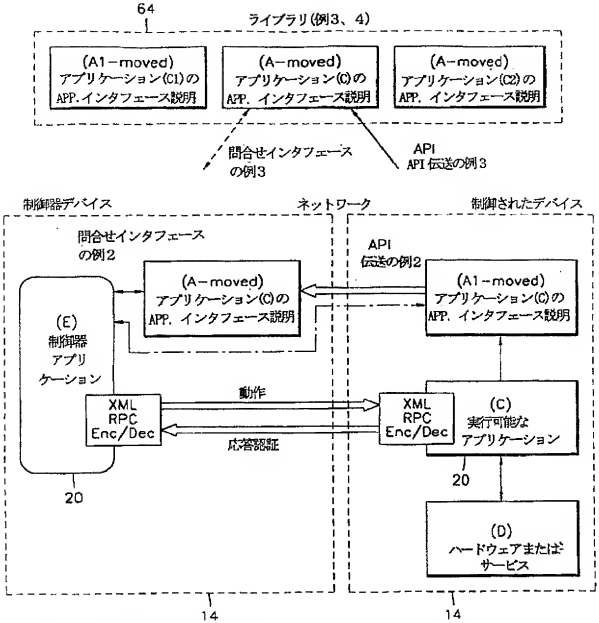
[Drawing 15]



[Drawing 16]

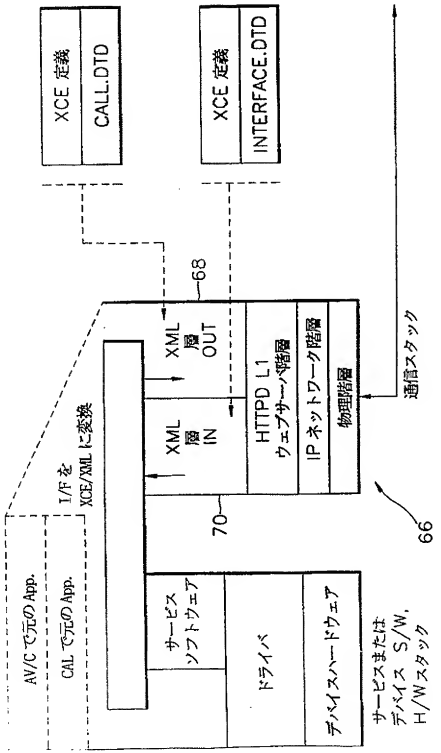

外部の INTERFACE－INSTANCE XML 伝送及び習得
デバイス B
INTERFACE－A.XML
INTERFACE－B.XML
XML 対象伝送
デバイス A
INTERFACE－A.XML
アプリケーションBによって
外部のアプリケーションA
インタフェース問合せ
XML 問合せ
10
アプリケーション B
20
14
アプリケーション A
20
14
ドライバ及び H/Wへ
ドライバ及び H/Wへ

[Drawing 17]

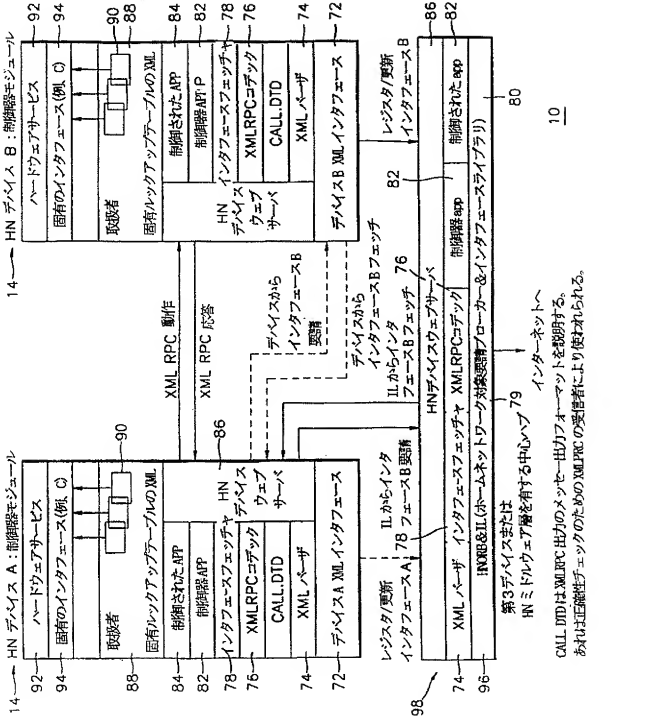


例1. (E)により遠隔で問合せるためのXMLアプリケーション-Cインタフェース(A).
例2. (E)により局部的に問合せるためのXMLアプリケーション-Cインタフェース(A)
を制御器に移動
例3. (E)により遠隔で問合せるためのXMLアプリケーション-Cインタフェース(A)
を第3デバイス-全てのインタフェースのための集合場所(ライブラリ)に移動
ライブラリは直接制御動作及び応答が有用に関したアプリケーションの住所(URL)
を有すべきである
例4. 例3と同じであるが、"間接的な制御動作(及び応答)がライブラリデバイスで
命令される. この場合にライブラリは"送達者と共に使われる

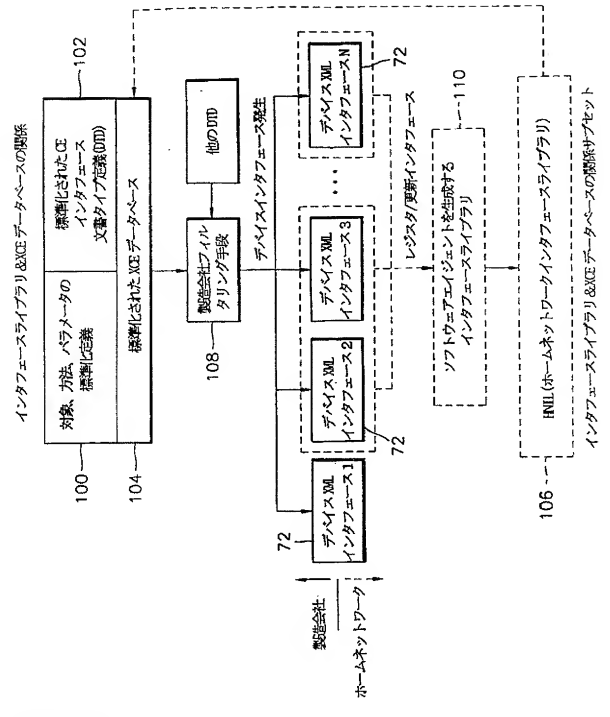
[Drawing 18]


XCE/XML プロトコルスタック
XCE 定義
CALL.DTD
XCE 定義
INTERFACE.DTD
68
XML 層 OUT
XML 層 IN
HTTPD L1 ウェブサーバ階層
IP ネットワーク階層
物理階層
通信スタック
I/F を XCE/XML に変換
AV/C で元の App.
CAL で元の App.
サービス ソフトウェア
ドライバ
デバイスハードウェア
サービスまたは デバイス S/W, H/W スタック
70
66

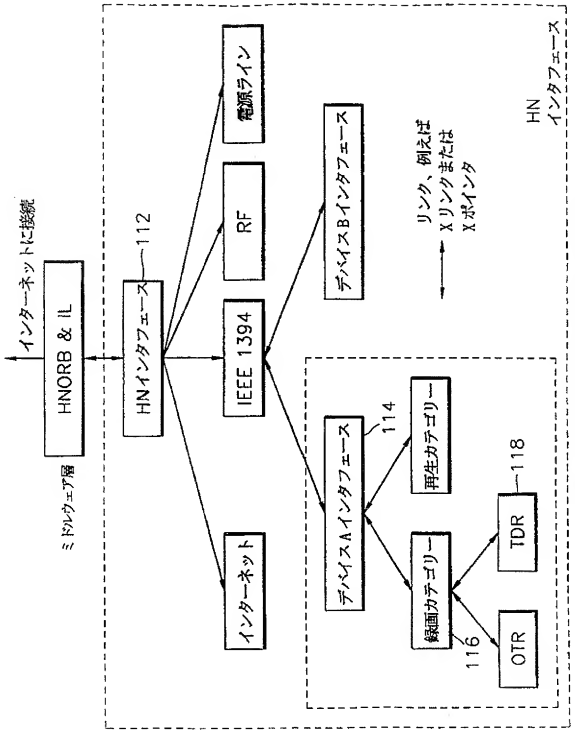
[Drawing 19]


HN デバイス A：制御器モジュール
14
ハードウェアサービス
92
固有のインタクフェース(例、C)
94
取扱者
90
88
固有ルックアップテーブルのXML
84
制御されたAPP
82
制御器APP
78
インタクフェースフェッチャ
HN デバイス ウェブ サーバ
76
XMLRPCコデック
CALL.DTD
74
XMLパーザ
72
デバイスA XMLインタクフェース
レジスタ/更新 インタクフェースA
78
ILからインタ フェースB要請
98
XML パーザ
インタクフェースフェッチャ
XMLRPCコデック
制御器app
制御されたapp
86
82
74
INDB&IL(ホームネットワーク対象要請ブローカー&インタクフェースライブラリ)
96
第3デバイスまたは HNミドルウェア層を有する中心ハブ
79
80
インターネットへ
CALL DTDはXMLRPC出力のメッセージ出力フォーマットを規定する。
あればIL固有性チェックのためのXMLRPCの受信者により使われる。
10
XML RPC 動作
XML RPC 応答
デバイスから インタクフェースB 要請
デバイスから インタクフェースBフェッチ
ILからインタ フェースBフェッチ
76
HN デバイス ウェブ サーバ
86
デバイスB XMLインタクフェース
レジスタ/更新 インタクフェースB
HN デバイス B：制御器モジュール
14
ハードウェアサービス
92
固有のインタクフェース(例、C)
94
取扱者
90
88
固有ルックアップテーブルのXML
84
制御されたAPP
82
制御器APP
78
インタクフェースフェッチャ
HN デバイス ウェブ サーバ
76
XMLRPCコデック
CALL.DTD
74
XMLパーザ
72
デバイスB XMLインタクフェース

[Drawing 20]


インタフェースライブラリ&XCEデータベースの関係
対象、方法、パラメータの標準化定義
標準化されたCEインタフェース文書タイプ定義(DTD)
標準化されたXCEデータベース
100
102
104
製造会社フィルタリング手段
他のDTD
108
デバイスインタフェース発生
デバイスXMLインタフェース1
デバイスXMLインタフェース2
デバイスXMLインタフェース3
デバイスXMLインタフェースN
72
72
レジスタ/更新インタフェース
ソフトウェアエージェントを生成するインタフェースライブラリ
110
HML(ホームネットワークインタフェースライブラリ)
106
インタフェースライブラリ&XCEデータベースの関係サブセット
製造会社
ホームネットワーク

[Drawing 21]

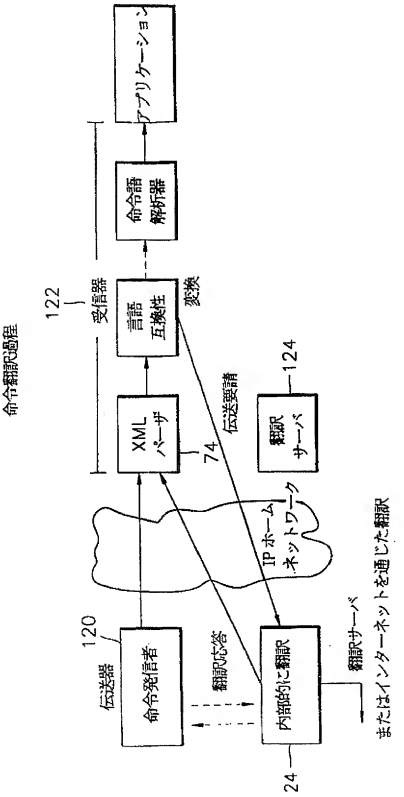

インターネットに接続
HNORB & IL
ミドルウェア層
HNインタフェース
112
IEEE 1394
RF
電源ライン
インターネット
デバイスAインタフェース
114
デバイスBインタフェース
再生カテゴリー
録画カテゴリー
116
OTR
TDR
118
リンク、例えば
Xリンクまたは
Xポインタ
HN
インタフェース
階層的なIL&デバイスインタフェースの例

[Drawing 22]

階層的なインタフェース構造．4階層

	階層	インタフェース階層	インタフェース例
112	1	各HNのためのXMLインタフェース、現在有用なデバイスリスト	My HN (VCR, TV ...)
114	2	各デバイスのための一般のインタフェース、機能カテゴリーリスト	一般のVCRインタフェース(録画、再生...)
116	3	デバイスに対する各機能カテゴリーのためのXMLインタフェース規格	VCR. 録画、カテゴリー
118	4	機能カテゴリーで各機能のためのXMLインタフェース規格	VCR. 録画、tdr機能

[Drawing 23]


命令翻訳過程
122
受信器
言語互換性
変換
命令語解析器
アプリケーション
XML パーザ
74
伝送要請
翻訳サーバ
124
IP ホーム ネットワーク
120
伝送器
命令発信者
翻訳応答
内部的に翻訳
124
翻訳サーバ
またはインターネットを通じた翻訳

[Drawing 24]

テーブル3：フォーマットとタイプ例

タイプ	フォーマット
命令	CAL, AV/C, X-10
映像	jpeg, gif, bitmap, tiff
言語	English, French, etc
ビデオ_ストリーム	mpeg2
ビデオ_クリップ	avi, quickime, mpeg
テキスト	html, plain
オーディオ	wav, aiff
アプリケーション	maword, pdf, postscript, gzip

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CORRECTION OR AMENDMENT

[Kind of official gazette]Printing of amendment by the regulation of 2 of Article 17 of Patent Law

[Section classification] The 3rd classification of the part VI gate
[Publication date]December 6, Heisei 19 (2007.12.6)

[Official announcement number] ** table 2002-514797 (P2002-514797A)
[Announcement date] May 21, Heisei 14 (2002.5.21)
[Application number]Application for patent 2000-547722 (P2000-547722)
[International Patent Classification]

G06F 13/00 (2006.01
[FI]

G06F 13/00 357 A
[Request for correction of an incorrect translation]
[Filing date]October 18, Heisei 19 (2007.10.18)
[Mistranslation correction 1]
[The document name for correction] Specification
[Correction object item name] Claim
[Correcting method] Change
[The contents of correction]
[Claim(s)]
[Claim 1]In a method for giving one's service on a home network,
(a) A stage of connecting the 1st home device to said home network,
(b) A stage of connecting the 2nd home device to said home network,
(c) A stage of providing a database containing two or more application interface explanation data objects is included, Each application interface explanation data object includes

information for a command of a home device by one or other home devices beyond it which were connected to said network, and control,
(d) A stage where said 1st home device accesses an application interface explanation data object for said 2nd home device in said database,
(e) Said 1st home device includes further a stage of transmitting a command and control data to said 2nd home device through said network using said application interface explanation data object for said 2nd home device, A method for giving one's service on a home network, wherein said 1st and 2nd home device offers said service autonomously by that cause.
[Claim 2]A method according to claim 1, wherein said structurized format includes an XML format.
[Claim 3]A method according to claim 1, wherein said database is contained in a database device connected to said network.
[Claim 4](i) Said 1st home device stores said 1st application interface explanation data object,
(ii) Said 2nd home device stores said 2nd application interface explanation data object,
(iii) The aforementioned (c) stage, In order to transmit said application interface explanation data object for said 1st and 2nd home device to said database device. A method according to claim 3 including an initialization stage which forms said database by a stage including asking said 1st and 2nd home device.
[Claim 5]A method according to claim 1, wherein the aforementioned (d) stage includes a stage of providing said 2nd home device with the 1st application interface explanation data object for said 1st home device from said database through a network.
[Claim 6]A method according to claim 1, wherein the aforementioned (e) stage includes a stage of providing said 1st home device with the 2nd application interface explanation data object for said 2nd home device from said database through a network.
[Claim 7]As a stage of connecting three or a home device beyond it to said network, At least one home device in order to ask an application interface explanation data object of two or more home devices for transmitting a command and control data to two or more home devices through said network. A method of including further a stage which accesses a database according to claim 1.
[Claim 8]A method according to claim 1, wherein each application interface explanation data object contains data in a structurized format.
[Claim 9]In a network system for providing service,
(a) The physical layer which provides communication media by which it is used with a device which carries out two-way communication, and in which it deals,
(b) The 1st home device,
(c) The 2nd home device,
(d) A database containing many application interface explanation data objects is included,

Each application interface explanation data object includes information on a format by which it was structurized for a command of a home device by other devices beyond one or it connected to said network, and control,

Said 2nd home device accesses the 1st application interface explanation data object for said 1st home device in said database, An application control means for transmitting control and instruction data to said 1st home device from said 2nd home device using said 1st application interface explanation data object is included,

Said 1st home device accesses the 2nd application interface explanation data object for said 2nd home device in said database, An application control means for transmitting control and instruction data to said 2nd home device from said 1st home device using said 2nd application interface explanation data object is included,

A network system for this to provide service, wherein said 1st and 2nd home device offers said service autonomously.

[Claim 10]The network system according to claim 9, wherein said structurized format includes an XML format.

[Claim 11]The network system according to claim 9, wherein said database is stored in a database device.

[Claim 12](i) Said 1st home device stores the 1st application interface explanation data object,

(ii) Said 2nd home device stores the 2nd application interface explanation data object,

(iii) Said database device, The network system according to claim 11 forming said database by asking said 1st and 2nd home device in order to transmit said candidate for the 1st and 2nd application explanation to a database device respectively.

[Claim 13]The network system according to claim 9, wherein an application control means of said 2nd home device obtains the 1st application interface explanation data object for the 1st home device from said database.

[Claim 14]The network system according to claim 9, wherein an application control means of said 1st home device obtains the 2nd application interface explanation data object for the 2nd home device from said database.

[Claim 15]At least one home device, In order to ask an application interface explanation data object of two or more home devices for transmitting a command and control data to two or more home devices through a network. The network system according to claim 9 by which three or a home device beyond it which accesses a database being included further.

[Claim 16]The network system according to claim 9, wherein each application interface explanation data object contains data in a structurized format.

[Claim 17]The network system according to claim 9, wherein said structurized format includes an XML format.

[Claim 18]In a method for giving one's service on a network,

(a) A stage asked to said device in order to acquire application interface explanation data, when a device is connected to said network is included, Said application interface explanation data includes information for a command of said device by other devices connected to said network, and control,
(b) A stage of storing said acquired application interface explanation data in a database,
(c) A stage of providing the 2nd device with application interface explanation data of the 1st device from said database is included further, A method for giving one's service on a network, wherein said 2nd device interacts with said 1st device using application interface explanation data of said 1st device for a command and control.
[Mistranslation correction 2]
[A document name for correction] A specification
[A correction object item name] 0002
[A correcting method] Change
[The contents of correction]
[0002]
[Description of the Prior Art]
Generally, a network contains the various devices which have the communication capability connected with the communication link and said communication link. Said device contains a computer, peripheral equipment, a router, a storage device, and the product possessing a processor and a communication interface. Devices various as one network embodiment can mention the home home network by which interconnection was carried out. The ordinary home can contain various devices containing the home device typically found in a personal computer and a home. The "device" as a term can contain other devices provided with the capability to exchange a logical device or functionality, and data typically, and can contain not only all the home devices but a general purpose computer. A home device A security system, movie theater equipment, TV, VCR, stereo equipment, The satellite broadcasting service with which digital satellite services (DSS: Digital Satellite Services) were known (DBSS: Direct Broadcast Satellite Services), A water-drench system, a lighting system, a microwave oven, a dishwasher, oven/stove, a washing machine/oven, and an electron device like a processing system automatic in the car are included.
[Mistranslation correction 3]
[The document name for correction] Specification
[Correction object item name] 0024
[Correcting method] Change
[The contents of correction]
[0024]
The client device 12 and the server device 14 can be physically connected with one unit

together, for example like DTV. In that case, said client device 12 provides the server control program 20 with a control user interface at least including the control program 20 for said server device 14 to control server hardware for control of server hardware, and a command. Drawing 5 is a drawing in which the example of the client device 12 is shown, and is (1). PDA for a GUI display (RemoteC), (2) DTV (STB) containing the receiver server which displayed GUI and comprised an audio and/or a video program stream destination server, (3) GUI is displayed, and in order to provide multiplex service, PC containing at least one server device can be included. The hardware or the thing which can be performed in DTV or PC client device is controlled by other client devices. Drawing 6 is the example of the server device 14 a shown drawing, and DVDP SmartCard as a server device of (1) transmitting side, (2) DVCR as a server device of the audio amplifier as a server device of a receiver, (3) transmitting side, or a receiver, and (4) The managing server for managing a remote server device is included. Said managing server can contain DSB-STB, cable TV-STB, or ATSC-STB. Such a device contains the managing server for the local control of STB internal work, or management. The external server accessed through the external network may be used by the local client device, for example for service like Video-on-Demand, Enhanced-TV, and Internet commerce.
[Mistranslation correction 4]
[The document name for correction] Specification
[Correction object item name] 0028
[Correcting method] Change
[The contents of correction]
[0028]
Drawing 8 shows the example of the audio / video (A/V) model which contains the server device 14 of the transmitting side, the server device 14 of a receiver, and the client device 12 in a network. The server device 14 of said transmitting side contains the control program 20 for controlling the data stream transmitting side hardware 32 of the server device 14 of the transmitting side,The server device 14 of said receiver contains the control program 20 for controlling the data stream receiver hardware 34 of the server device 14 of a receiver. In order that a user may work the data stream transmitting side hardware 32, the server device 14 of the transmitting side is controlled by illustration operation, and in order to work the data stream receiver hardware 34, the client device 12 which controls the server device 14 of a receiver is used. In initializing the data communications from the data stream transmitting side hardware 32 to the data stream receiver hardware 34, the user does not need to operate said client device 12 any more. In other one side, the user can program future initial-data transmission and does not need to operate the client device 12 any more.The data stream transmitting side hardware 32 of the server device 14 of the transmitting side and the data stream receiver hardware 34 of the server device 14 of a receiver initialize data communications automatically

henceforth at the time programmed by the user.
[Mistranslation correction 5]
[The document name for correction] Specification
[Correction object item name] 0029
[Correcting method] Change
[The contents of correction]
[0029]
For example, said data stream transmitting side hardware 32 can contain a tuner access device like satellite broadcasting (DBS: Direct Broadcast Satellite). DBS is a multiplex-channel replaced with cable TV, and provides a small satellite antenna (3 foot 18 inches in diameter) with television programming like a cable directly from a satellite. It permits that 200 or more channels also receive the satellite antenna located in the place where some standard analog TV signals were compressed in digital one by the single satellite transponder, and the air was specified with DBS. Said data stream receiver hardware 34 can contain the command and digital video cassette recorder (DVCR) which can carry out decoding of the digital video signal compressed at the time of reproduction. A user provides the command and control data containing the "time-delay recording" event data for DVCR, and the "time-delay selection program" event data for a tuner access device. Said tuner access device chooses the program of hope after time delay, and from a user, even when he has no additional control operation, DVCR which receives and records program data is provided with source program data.
[Mistranslation correction 6]
[The document name for correction] Specification
[Correction object item name] 0030
[Correcting method] Change
[The contents of correction]
[0030]
Furthermore drawing 9 contains server device 14 SERVER1 of the transmitting side, server device 14 SERVER2 of a receiver, and the client device 12 in a network at least, it is a drawing in which other A/V models are shown. In order that said client device 12 may choose and control server device 14 SERVER1, and SERVER2 and other server devices 14, for example, SERVER3 and SERVER4, (not shown), The session manager 36 with the user interface which displays the selection information for a user is included.Selection information contains the icon symbol assigned to Serv1, Serv2, Serv3, and Serv4 by the session manager 36 for the user who chooses respectively server device 14 SERVER1, SERVER2, SERVER3, and SERVER4. Server device 14 SERVER1 of said transmitting side can contain DVCR, and server device 14 SERVER2 of said receiver can contain 1/2DTV.
[Mistranslation correction 7]

[The document name for correction] Specification
[Correction object item name] 0031
[Correcting method] Change
[The contents of correction]
[0031]
as an example of operation -- the server device 14 -- in selection of SERVER1 and SERVER2, Said client device 12 transmits GCO22 of each server device 14 to a client device, and displays each server device 14 SERVER1 and GUI18 corresponding to SERVER2. The user can interact with control and GUI18 of each server device 14 which provide a command to the server device [/ for service] 14. Each server device 14 is combined with the server device 14 of independent or others, and can provide service. In order to give one's service, the server device 14 needs said session manager 36, and he transmits the control state data 26 between GUI18 of said server device 14 with said client device 12. Based on user control and instruction information, the two or more server devices 14 can communicate a command and control information in between [these], in order to provide the service for which a user asks.
[Mistranslation correction 8]
[The document name for correction] Specification
[Correction object item name] 0032
[Correcting method] Change
[The contents of correction]
[0032]
Said session manager 36 can contain the software agent who has a function which accesses the useful home network service provided by the various server devices 14, and displays it in the network 10. Said software agent adjusts the performance of the various server devices 14 in the network 10 additionally, and the selection information only for said server device 14 which has compatible performance is displayed. The selection made from GUI18 of the one server device 14 so that a user might provide the command and control information where the server device 14 has a meaning, and the selection made from GUI18 of other server devices 18 are adjusted by the session manager 36.
[Mistranslation correction 9]
[The document name for correction] Specification
[Correction object item name] 0033
[Correcting method] Change
[The contents of correction]
[0033]
The session manager 36 searches a network with the example of further others of operation, and performs in it the software agent who finds the server device 14 connected to the network.

Said software agent accesses the performance data stored in each server device 14, in order to opt for the performance of the server device 14 again, and he provides a user with the information over the performance. And said session manager 36 displays selection icon Serv1, Serv2, Serv3, and Serv4 for server device SERVER1, SERVER2, SERVER3, and SERVER4, as shown in drawing 9.

[Mistranslation correction 10]

[The document name for correction] Specification

[Correction object item name] 0034

[Correcting method] Change

[The contents of correction]

[0034]

Said session manager 36 makes all the selection icon Serv1, Serv2, Serv3, and Serv4 enable in early stages so that a user can choose in all the four icons. After a user clicks on a Serv1 selection icon and chooses server device SERVER1, said session manager 36 determines that he cannot carry out the performance top compatibility of the server devices SERVER3 and SERVER4 with server device SERVER1. Therefore, said session manager 36 does the disable of the selection icons Serv3 and Serv4 respectively for the server devices SERVER3 and SERVER4. And the user can click on the icon Serv2, in order to order and control server device SERVER2.

[Mistranslation correction 11]

[The document name for correction] Specification

[Correction object item name] 0035

[Correcting method] Change

[The contents of correction]

[0035]

Like interacting with GUI18 of the server device 14 with which the user was chosen, the control and instruction information which were inputted into each GUI18 by the user provide the additional performance information which has on the server device selection which follows by a user. For example, if the VCR server device 14 is chosen, it will be influenced by the determination of the user on whom operation of succession by the session manager 36 plays or records the selection icon for other server devices 14 in enabling or carrying out a disable.

[Mistranslation correction 12]

[The document name for correction] Specification

[Correction object item name] 0037

[Correcting method] Change

[The contents of correction]

[0037]

Since each server device 14 is transmitted or received on a network for other various services, as shown in drawing 10, each server device 14 stores a performance data table (performance table 1).The 1st row of the table 1 checks the service performance of the server device 14, and said server device 14 checks the transmitting side or a receiver for the service corresponding to the 1st row in the 2nd row. New service is performed using the performance data table 1, while maintaining still older device and compatibility. For example, if still older service and the new service by which compatibility is carried out are developed, An execution device can be written in the performance data table 1 for the device which offers said new service as it maintains the old device and compatibility which use service with both old new service and old service.

[Mistranslation correction 13]

[The document name for correction] Specification

[Correction object item name] 0038

[Correcting method] Change

[The contents of correction]

[0038]

By a 1st embodiment, a device manager performs matching or comparison of the service device of the transmitting side and a receiver. For example, said device manager can also perform the role of the software agent who compares the performance and the characteristic of the various server devices 14 and the specified server device 14 with compatibility matching. Service even the 2nd server device 14 from the 1st server device 14 over a network In for example, the case of a media stream.the 2nd server device 14 with which compatibility of the user is carried out to the performance of the 1st server device 14 for said device manager -- judgment -- the performance of the 1st and 2nd server device 14 is compared so that it may be powerful and can choose. Next, the example of the service performance list of [for the embodiment of the server device 14] is shown.

Stream_format_video_dv

Stream_format_video_mpeg2tpt

Stream_format_video_dsstpt

Stream_format_video_mpeg2pes

Stream_format_video_mpeg210901-tpt

[Mistranslation correction 14]

[The document name for correction] Specification

[Correction object item name] 0039

[Correcting method] Change

[The contents of correction]

[0039]

As shown in drawing 11, each server device 14 stores further the characteristic data table (characteristics table 2) containing the characteristic about a device. A name and a value define each characteristic by the table 2. It is not required although character length is shown in the table 2. Said characteristic data is useful to other server devices 14 which make information processing interoperability easy on the network 10, and store device information. For example, a device page uses the characteristics table 2 which stores a device name so that it may be mentioned later. Other fields can be added to the characteristic data table 2, when required.

[Mistranslation correction 15]

[The document name for correction] Specification

[Correction object item name] 0041

[Correcting method] Change

[The contents of correction]

[0041]

With the characteristics table 2, said device position-characteristics field is used in order to store the position or group for each server device 14. The device type characteristic field writes in the device type for the specific server device 14 like VCR, DVD, DTV, a camcorder, PC, and a security system. Supposing the device itself does not supply a device icon, said device type characteristic field will be used in order to select the default device icon which expresses a device on a device page. The characteristics table 2 can include the multiplex writing for default sauce and the default sink characteristic field. Such each writing expresses the server device 14 of other default transmitting side for each data type processed by the server device 14, or a receiver.

[Mistranslation correction 16]

[The document name for correction] Specification

[Correction object item name] 0045

[Correcting method] Deletion

[The contents of correction]

[Mistranslation correction 17]

[The document name for correction] Specification

[Correction object item name] 0046

[Correcting method] Deletion

[The contents of correction]

[Mistranslation correction 18]

[The document name for correction] Specification

[Correction object item name] 0047

[Correcting method] Deletion

[The contents of correction]
[Mistranslation correction 19]
[The document name for correction] Specification
[Correction object item name] 0049
[Correcting method] Change
[The contents of correction]
[0049]
A user is replaced by the software client control program 50 by "B" a 2nd embodiment.Said software client control program 50 generates command posting to service application"S" of an XML base, and receives XML command posting replied. And said software client control program 50 is replaced by "C" a 3rd embodiment by application [like the server device control programs 20 exchanged between the two service applications 20] whose command and response are. In this point, it is when embodiment "embodiment in which B" has NARU (Null) service" C" is special.
[Mistranslation correction 20]
[The document name for correction] Specification
[Correction object item name] 0052
[Correcting method] Change
[The contents of correction]
[0052]
If the API extension for the service A is referred to, the 1st top block 52 provides a synthetic definition or database of the method for CE using the English word explaining CE device. The synthetic definition or database which uses .XML which can exist in other formats as which said synthetic definition or the database can express C, XML or an object, and the method of these each one is called a XCE definition. 54 provides the 2nd block of the format which expresses API by XML form for all the server devices 14 designed by interface data-type definition INTERFACE.DTD.
[Mistranslation correction 21]
[The document name for correction] Specification
[Correction object item name] 0064
[Correcting method] Change
[The contents of correction]
[0064]
If drawing 17 is referred to, other examples which control the device device or internal device between the controller server device 14 and the controlled server device 14 are shown. The server device 14 by which said controller server device 14 was controlled including controller application contains the application C which can be performed. The controlled server device 14

includes application interface explanation of INTERFACE-A.XML and the application C further. The application E accesses the application interface explanation A in the server device 14 controlled in order to ask the performance of the server device 14 and the controlled API interfacing method of the server device 14 which were controlled. Next, the application E orders and controls the application C using an XML remote procedure call, in order to control the controlled hardware of the server device 14 or the service D. A scheduler device may be the 1 case of the controller server device 14 which will be driven if the day set like the time-delay-recording control machine of VCR comes.

[Mistranslation correction 22]

[The document name for correction] Specification

[Correction object item name] 0065

[Correcting method] Change

[The contents of correction]

[0065]

By the 1st example, said application E accesses the application interface explanation A by remote reference which led the network. By the 2nd example, said application E accesses the application interface explanation A by transmitting the copy of the application interface explanation A to the controller server device 14 from the controlled server device 14. Next, the application E is locally asked to the interface explanation A. It is transmitted to the library device 64 which the application interface explanation A provides with library space by the 3rd example for interface explanation, and the application E asks the interface explanation A distantly in a library. Said library device 64 stores the address (URL) of the related application which can use a direct control action and response.

[Mistranslation correction 23]

[The document name for correction] Specification

[Correction object item name] 0066

[Correcting method] Change

[The contents of correction]

[0066]

If drawing 18 is referred to, an XML protocol provides a web standard common middleware hierarchy in the communications stack 66 on the API level between the applications 20 of the various server devices 14 with a network. The topmost part application of a communications stack transmits and receives a communication message through a network with each server device 14, and it communicates with a software hierarchy by the device stack which controls locally the device hardware or service software for a device.

[Mistranslation correction 24]

[The document name for correction] Specification

[Correction object item name] 0069
[Correcting method] Change
[The contents of correction]
[0069]
Each server device A and B includes the hardware and software for controlling other server devices through a network and being controlled by other server devices through a network. In drawing 19, the home network device A is a controller device or a module, and the home network device B is the controlled device or module. Each device A and B includes the local device XML interface 72 which comprised interface document INTERFACE.XML and document type definition INTERFACE.DTD. An INTERFACE. XML document includes explanation of the object supported by the corresponding server device 14, a method, and a parameter. Said INTERFACE.DTD document is used with the XML interface of a device for a concrete justification check, as mentioned above.
[Mistranslation correction 25]
[The document name for correction] Specification
[Correction object item name] 0071
[Correcting method] Change
[The contents of correction]
[0071]
Interface Fetscher (Fetcher) who comprised a program code, It is used by each device A and B in order to fetch the device interface of the device of direct further others from the device or the home network interface library 80 of further others. If the server device 14 is a controller device, the controller application program code 82 in the controller server device 14, Other commands and control of the server device 14 are affected through a network by controlling the software and hardware in the controller server device 14 like XML parser 74, interface Fetscher 78, and the XMLRPC codec 76. If it is the device by which the server device 14 was controlled, The controlled application program code 84 in the controlled server device 14 controls the software and hardware in the server device 14 for the server device 14 controlled by other server devices 14. The home network device web server 86 in each device A and B manages communication between the devices on a network. XML to the peculiar look-up table 88 in each devices A and B X, It is used by the controlled application 84 which changes a MLRPC message (for example, a method name, a component name, and a type) into the peculiar interface (for example, the peculiar method name, a component, and a type) of a device. Within an XML message, said table 88 is not used, when the peculiar interface of a device is the same as the name of a method and a parameter.
[Mistranslation correction 26]
[The document name for correction] Specification

[Correction object item name] 0073
[Correcting method] Change
[The contents of correction]
[0073]
Furthermore, The request broker for a home network (HNORB: .) Home Network Object Request Broker79 and a request broker for a network like an interface library (IL: Interface Library) provide the middleware hierarchy 98 for the home network 10. As shown in drawing 19, said middleware hierarchy 98 can be located in the 3rd device 96 or the separated control hub. Said HNORB79 contains the software agent for being used by the one server device 14 which finds existence of other server devices 14 connected to the network 10. Said HNORB software agent organizes a device name by the hierarchical tree structure of a name, organizes a device interface in said interface library which can be searched, and provides with a device interface the device which demands interface information.
[Mistranslation correction 27]
[The document name for correction] Specification
[Correction object item name] 0075
[Correcting method] Change
[The contents of correction]
[0075]
In order to use said interface library 80, at least one HNORB&IL should be working on the local home network 10. One or more HNORB&ILs are used again. For example, all of a cable modem, some DTV, and a central home hub can have a HNORB&IL software agent of these very thing. In order to define the position of HNORB&IL, the server device 14 transmits a broadcast massage through a local home network. The 1st HNORB&IL that answered with the server device 14 is used by the server device 14. If HNORB&IL is located once, the server device 14 and HNORB&IL will register, Device lookup service can be checked between [TCP (Transmission Control Protocol) or UDP (User Datagram Protocol)] the points for an interface request and fetch. If an UDP protocol cannot be used, it is used for high bandwidth width connection [like IEEE1394] whose TCP protocol is. XMLRPC of a HTTP-base is used for the device for HNORB&IL communication. For example, in order that the server device 14 may pass a device interface as one or more components, the "register" method of HNORB can be called distantly, Or the XMLRPC call can reproduce a partial or overall device interface from IL as a value which XMLRPC-answers or returns.
[Mistranslation correction 28]
[The document name for correction] Specification
[Correction object item name] 0076
[Correcting method] Change

[The contents of correction]
[0076]
As mentioned above, one or more HNORB&ILs can operate by the local home network 10 simultaneously, Each HNORB&IL can recognize the subset of an usable device here, and one HNORB&IL can communicate with other HNORB&ILs in order to locate the server device 14 which is not found. Multiplex HNORB&IL on the one local home network 10 can be automatically located mutually by using a broadcast massage like UDP and TCP. In such a case, multiplex HNORB&IL constitutes the request broker for distribution, while many interface libraries 80 constitute a distributed interface library. In order to provide a fault-tolerant error, supposing one HNORB&IL must finish suddenly, all the devices registered with this HNORB&IL will be notified, and said device will be automatically registered with other useful HNORB&IL.
[Mistranslation correction 29]
[The document name for correction] Specification
[Correction object item name] 0082
[Correcting method] Change
[The contents of correction]
[0082]
Desirably, a standard XMLRPC format is used so that all the devices may explain a RPC call and decoding of them can be carried out through a network. In order to raise efficiency desirably [since the device interface of the controlled server device 14 is asked by the controller server device 14 and investigated], the simplified XMLRPC format which has sufficient device interface information is used. The following example shows two possible formats which call XMLRPC for OTR (One Touch Record) and TDR (Time Delayed Record) operation.
[Mistranslation correction 30]
[The document name for correction] Specification
[Correction object item name] 0085
[Correcting method] Change
[The contents of correction]
[0085]
If drawing 20 is referred to, the device interface for the server device 14 which is a home device is based on the database 100 with which the industrial standard which uses the standardized term was structurized. The interface data and the term for a new interface are added to the database 100. In order to explain CE object, a comprehensive definition or database, method, and parameter which use an English word are specified in the CE database 102. A comprehensive definition or database can become C and XML which show an object,

the method of each of them, and a component, or other formats. The comprehensive definition or database which uses the standardized XML term is called a XCE definition or the database 104.

[Mistranslation correction 31]

[The document name for correction] Specification

[Correction object item name] 0087

[Correcting method] Change

[The contents of correction]

[0087]

The information designed as 'manufacturing-company' information by drawing 20 for the embedded device 14 is built in the device 14 at the time of manufacture, and the information designed as a 'home network' is a part of-like execution time feature of a device of operation in a network. 1 for N device .... The device XML interfaces 72 designed as N are some data in the standardized XCE database 104. The home network interface library (HNIL: Home Network Interface Library) 106 provides a device interface set of the usable server device 14 connected to the home network. HNIL 106 is a subset of the whole XCE database 104.

[Mistranslation correction 32]

[The document name for correction] Specification

[Correction object item name] 0089

[Correcting method] Change

[The contents of correction]

[0089]

If drawing 20 is referred to, said XCE database 104, The XCE interface document type definition (DTD: Document Type Definition) by which it was standardized for CE device which provides the regulation set standardized in order to use XML expressing CE server device 14 is provided. Said DTD or its subset is used for a justification check. Although the software agent designed as the manufacturing-company means 108 filters and uses the subset of the XCE definition by which it was standardized for specified CE device, For example, standardized XCE interface DTD which generates the XML device interface 72 of a CE device like INTERFACE.XML and INTERFACE.DTD is used. Said document INTERFACE.XML includes explanation of the object supported by a special device according to standardized XCE interface DTD, a method, and a parameter. Said document INTERFACE.DTD is a subset of standardized XCE interface DTD, and is used for the justification check for the XML interface of a device. It is used in order that other document type definitions may generate an INTERFACE. XML document.

[Mistranslation correction 33]

[The document name for correction] Specification

[Correction object item name] 0090
[Correcting method] Change
[The contents of correction]
[0090]
The XML interface 72 of CE device containing said XML interface document and said DTD document is stored in a library like the home network interface library 106 which can generally be accessed. The software agent 110 collects the device interfaces 72 of all the server devices 14 on a network which can be accessed, and arranges them to the structurized interface library 106 which can be searched with a device name/address information. Said interface library 106 is a subset of the XCE database 104, and the process in which the interface library 106 is made is similar to reconstructing a portion or all the XCE databases 104. Said interface library 106, It can function as the cash (Cache) for which it depends on the usefulness of all the server devices 14 by the home network in which a set of the device interface of all the devices in a home network or the device interface 72 most used for these days is stored. When the server device 14 originates in an event like changing a disk with a DVD regenerator and updates the device interface 72, some device interfaces 72 are updated based on event service.
[Mistranslation correction 34]
[The document name for correction] Specification
[Correction object item name] 0091
[Correcting method] Change
[The contents of correction]
[0091]
If drawing 21 is referred to, it has a desirable gestalt with the hierarchical device interface definition 72 of each server device 14. This is because the device interface definition 72 may become long in a home device. The function of one or a small number typically like the single function for the recording by which time delay was carried out is accessed simultaneously, therefore a small portion is used for only [of said device interface 72]. It is more effective than creating the whole device interface 72 to create some device interfaces 72. By using a hierarchical device XML interface, the controller server device 14, By specifying a desirable functional category or function in the demand for an XML device interface from the controller server device 14 or HNORB, and IL middleware hierarchy 98, The partial device interface 72 of the controlled server device 14 can be searched for. In the case of the latter, HNORB and IL middleware hierarchy 98 forward the desirable portion of the device interface 72.
[Mistranslation correction 35]
[The document name for correction] Specification
[Correction object item name] 0094

[Correcting method] Change
[The contents of correction]
[0094]
With the typical command and control model for the server device 14 which controls other server devices 14 concerning this invention, the 1st server device 14 is tried so that the device interface of the 2nd server device 14 may be asked on the 2nd interface hierarchy 114.After choosing a functional category (FC: Function Category), said 1st server device 14 asks the interface hierarchy 116 of a specific functional category with the 2nd server device 14 like a recording category. Said 1st server device 14 asks the interface hierarchy 118 a specific function like OTR or TDR, in order to make the call to said function. As a hierarchical or interface function with a more effective tree structure is looked for, network band width is contracted. It is as interface file structure and the example of a layer being the following.
1st layer 112-HN1.xmlXML
2nd layer 114-VCR1.xml
3rd layer 116-VCR1_RecordCategory.xml
4th layer 118-VCR1_RecordCategory_OTR.xml
[Mistranslation correction 36]
[The document name for correction] Specification
[Correction object item name] 0097
[Correcting method] Change
[The contents of correction]
[0097]
Said hierarchical device interface definition 72 includes the following fields.
'document file' and this provide the name of the regulation (DTD) file of the document type used by the XML parser for verification of the justification of the version portion of the XCE database 104 or the XCE database 104, and correction. Being able to consider various DTD files for the portion into which said XCE structure is different, said DTD differs from INTERFACE.DTD for the document type definition for RPC.CALL, and communication here.
'doc' and this provide compatibility, the characteristic, communication, and the highest level name of the field of a control interface.
'Services_home' and this provide the field for home automation, electric appliances, and use nature.
'Server_auto' and this show the useful message interface over one set or the automobile type beyond it to the car in a car barn. For example, 'server_auto_ford_explorer_98' is an interface to a specific car. This enables it to access the mileage and maintenance interface of a car, and the car manufactuing company or car barn checked directly is used by a direct check or the remote access which carries out the telediagnosis.

'server_samsung_web_site' and this communicate with the manufacturing-company website of the home exterior, and include the interface for a message, service, assistance, etc. 'AVC_commands' and 'CAL_commands', and this provide the legacy device which can interpret AV/C and a CAL language.This structure part checks a command in said language, and a command is added by XML or is performed. Therefore, as for said item, the protocol converter application for XCE (Web) is used as an interface to original CAL or AV/C application software.

[Mistranslation correction 37]

[The document name for correction] Specification

[Correction object item name] 0100

[Correcting method] Change

[The contents of correction]

[0100]

If the contents mentioned above are referred to, 'service_id' or 'application_interface_id' includes the URL position of a name, an address, a web address, or one or more devices. Since the XCE database 104 constitutes the whole on which it has agreed to an interface, Usually, a DHCP (Dynamic Host Configuration Protocol) software agent assigns an address and a default name to each device, and said address and a default name are added to service or the interface of a device. And in order that the software agent 110 may generate 'a partial XCE network (Network partial XCE)', The device interfaces 72 which contain a subset or 'a partial XCE device (Devicepartial XCE)' from all the devices locally connected to the home network are collected. An additional related external interface is added to the structure for external control. For example, 'service_id' may be the name/address in the received structure which includes subscription from a software agent with the device interface of the device connected to the network, or the network interface library 106. Then, the user can search service with a database and can access the application which contains the specific data part of a library using said name/address. Therefore, the network can include the same multiplex service identified by said name/address information.

'media' and this provide the interface for the media type containing the disk and tape for the transmission stream from a tuner, RAM from PC DRAM, DC, or DVD. Said media are named and checked and the controller device can search the XCE database which checks the general media provided on a network. When new media like a DVD disk are provided on a network, some device interfaces 72 which check program data on a disk are changed into conformity. Therefore, the whole device interface 72 does not need to be transmitted and the portion for which it was merely suitable is transmitted to a XCE database. By reception of an attention signal, the library software agent 110 can fetch new updating, and is located in it by the place for which it was suitable. Addition of a disk medium is similar to adding service to said network

or connecting other devices to said network.
'rate' and this provide the value to the data stream rate for a device interface like for example, 6 Mbits/Sec or 19.2 Mbits/Sec.
'protocol' and this check the protocol used for said data stream. For example, a desirable protocol will be chosen if 61883/1394 or U is provided with one or more protocols like /IP.
'stream_format' and this provide the packet format and/or compression standard for the Digital Stream audio and video division. If one or more formats are provided, a desirable format will be chosen through an interface message. The format which can determine whether the controller application 82 has an interexchangeable format can be investigated.
'controls_av' and this provide the main control interface for an A/V media device.
'Flow_control' and this are the methods for a specific device, and provide data stream control like PLAY, STOP, GOTO, and RECORD. The method does not change to the device (Embedded) embedded, for example except for PC software. The tkdrl control can include a time component for the delayed operation.
'Tuning' and this provide the interface for tuning control. The controller server device 14 can ask for the reply of the electronic program guide (EPG: Electronic Program Guide) data structure mentioned above by the interface of the controlled server device 14.
'UIcontrol' and this provide with a control interface the application 84 controlled in order to control correction like the volume to the luminosity and the contrast, and the audio to a display, and a base.
'Timer_record' and this provide the interface for a set updater to the controller application 82, in order to embody the delayed time record. Direct channel alignment information and flow control (time_aparams) information are used.
[Mistranslation correction 38]
[The document name for correction] Specification
[Correction object item name] 0102
[Correcting method] Change
[The contents of correction]
[0102]
In other viewpoints, this invention provides use of the instruction word embodiment which exists in a network for a device device command and control. A device has API which generates a binary number sequence at the time of execution according to the existing transmission mechanism for an inside. In such a case, in order to provide the server device 14 of further others with an XML remote procedure call (XMLRPC: XML Remote Procedure Calls) from the one server device 14 in a network, The existing application interface embodiment is exchanged by the call to XML service API. Therefore, original embodiment is equivalent to the trumpet (Wrapper) for XML service API. Drawing 18 shows the application generated as

interface embodiment exchanged by the trumpet by XCE/XML service API again using CAL in a dotted line, or other instruction words like AV/C. The example which changes a XMLRPC format from a CAL instruction word is shown below.

---

existing implementation:

```
void DeviceCALCommand(int command){
x
x
/*
create CAL formatted byte string to represent this
object/method and output to the wire
*/
CreateCALFormattedByteString(command);/* different for
every protocol*/
SendCALByteString(); */different for every protocol
*/
}
```

---

wrapping the XML Service API call:

```
void DeviceCALCommand(int command){
{
/*
replace CAL implementation with calls to the XML
ServiceAPI
*/
CreateXMLMessage(command); /* always the same */
sendXMLMessage(); /* always the same */
}
```

[Mistranslation correction 39] `

[The document name for correction] Specification

[Correction object item name] Brief explanation of the drawings

[Correcting method] Change

[The contents of correction]

[Brief Description of the Drawings]

[Drawing 1]It is a block diagram for the embodiment of the network concerning the 1st viewpoint of this invention.

[Drawing 2]It is a block diagram of drawing 1 concerning a 1st embodiment of device control

and outline corresponding.
[Drawing 3]It is a block diagram showing a 1st embodiment to the home network system concerning this invention containing many clients and server devices.
[Drawing 4]It is a block diagram showing the client device of drawing 3, and a 1st embodiment of server device embodiment.
[Drawing 5]It is a drawing in which a 1st embodiment of client device embodiment is shown.
[Drawing 6]It is a drawing in which a 1st embodiment of server device embodiment is shown.
[Drawing 7]It is a block diagram showing mutually a 2nd embodiment of the network server device which enables communication and control.
[Drawing 8]It is a block diagram showing a 1st embodiment to the structure of the audio / video model which contains the server device of the transmitting side, the server device of a receiver, and a client device in a network.
[Drawing 9]It is a drawing in which other embodiments of an audio / video model are shown.
[Drawing 10]It is a drawing in which the embodiment of the performance data table for a network device is shown.
[Drawing 11]Drawing 11 is a drawing in which the embodiment of the characteristic data table for a network device is shown.
[Drawing 12]It is a drawing in which the composition of a 1st embodiment to the building block which generates a command message between network devices is shown.
[Drawing 13]It is a drawing in which the composition of other embodiments of the building block concerning drawing 12 which generates a command message is shown.
[Drawing 14]It is a drawing in which a 3rd embodiment of an interaction is shown between a network client and a server device.
[Drawing 15]It is a block diagram of a 1st embodiment that defines API extension of a network device interface.
[Drawing 16]It is a drawing in which the structure of a 1st embodiment for the server device application which accesses the interface explanatory note document of other server devices is shown.
[Drawing 17]It is a drawing in which other embodiments of the internal-device control structure between a controller server device and the controlled server device are shown.
[Drawing 18]It is a drawing in which the embodiment of an XML protocol which provides a web standard common middleware hierarchy by a communications stack on the API level between network devices is shown.
[Drawing 19]It is a drawing in which other embodiment of the instruction control structure between server devices again is shown.
[Drawing 20]It is a drawing in which the relation between a device interface library and the electric appliance database for a home device is shown.

[Drawing 21]It is a drawing in which the embodiment of a hierarchical gestalt to a device interface definition is shown.
[Drawing 22]It is a drawing in which a hierarchy's 1st embodiment is shown by the device interface definition of drawing 21.
[Drawing 23]It is a drawing in which common transmission and an interpretation procedure are shown between a transmitter and a receiver device.
[Drawing 24]It is a drawing in which the packet type for providing the translation service concerning the 1st viewpoint of this invention and a 1st embodiment of the partial list table of a format are shown.
[Description of Notations]
10 Network
12 Client device
14 Server device
16 Communication link
18 GUI display
20 Server control program
22 Graphic controlled object (GCO) user interface description
24 Client device renderer
26 Control state data
28 Clock
30 Instruction word interface
32 Data stream transmitting side hardware
34 Data stream receiver hardware
36 Session manager
40 The functional standard block of service
42 The block with which a message element is constituted
44 Industrial standardization format block
46 Message compressed block
48 Message character string configuration block
50 Software client control program
52, 54, 58, and 60 Block
56 and 62 Look rise table
64 Library device
66 Communications stack
68 XML layer OUT
70 XML layer IN
72 XML interface

74 XML parser
76 XMLRPC codec
78 Interface Fetscher
79 The request broker for a home network
80 Home network interface library
82 Controller application program code
84 Application program code
86 Home network device web server
88 Peculiar look-up table
90 Hair drier
92 Hardware service
94 Peculiar interface
96 The 3rd device
98 Middleware hierarchy
100 Database
102 CE database
104 XCE database
106 Home network interface library
108 Manufacturing-company means
112,114,116,118 Hierarchy
120 Transmission device
122 Request device
124 Translation device
[Mistranslation correction 40]
[The document name for correction] DRAWINGS
[Correction object item name] Drawing 5
[Correcting method] Change
[The contents of correction]
[Drawing 5]

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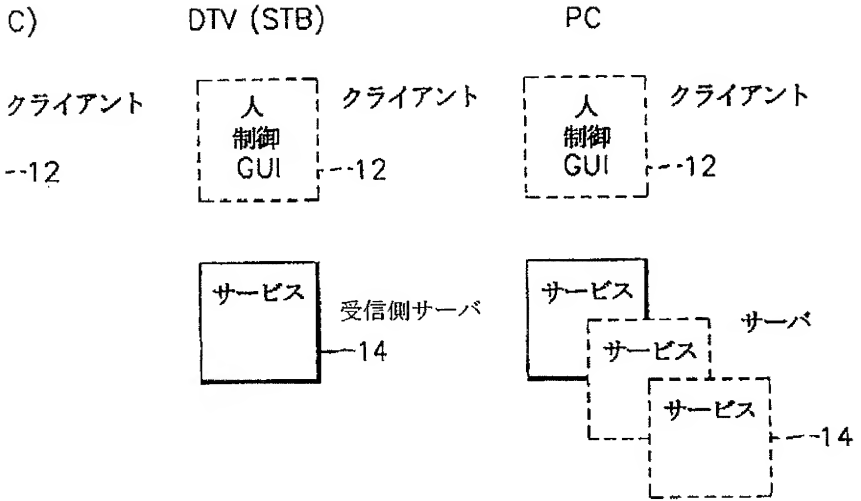
クライアントの構成要素



[Mistranslation correction 41]
[The document name for correction] DRAWINGS
[Correction object item name] Drawing 6
[Correcting method] Change
[The contents of correction]
[Drawing 6]

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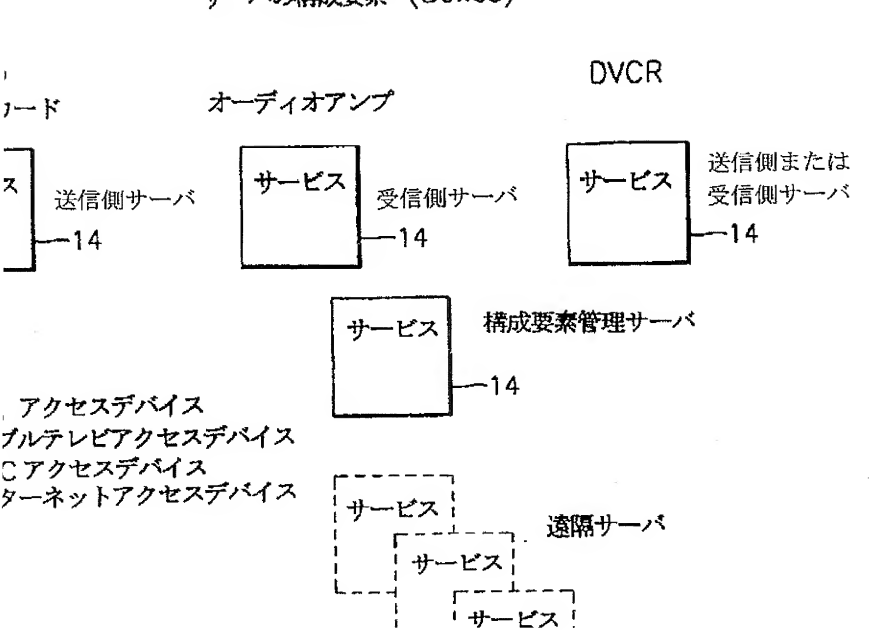
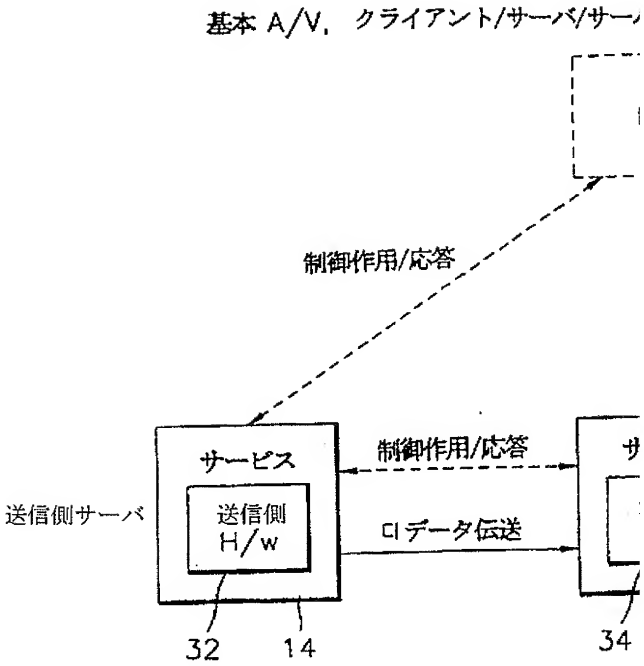


[Mistranslation correction 42]
[The document name for correction] DRAWINGS
[Correction object item name] Drawing 8
[Correcting method] Change
[The contents of correction]
[Drawing 8]



[Mistranslation correction 43]
[The document name for correction] DRAWINGS
[Correction object item name] Drawing 9
[Correcting method] Change
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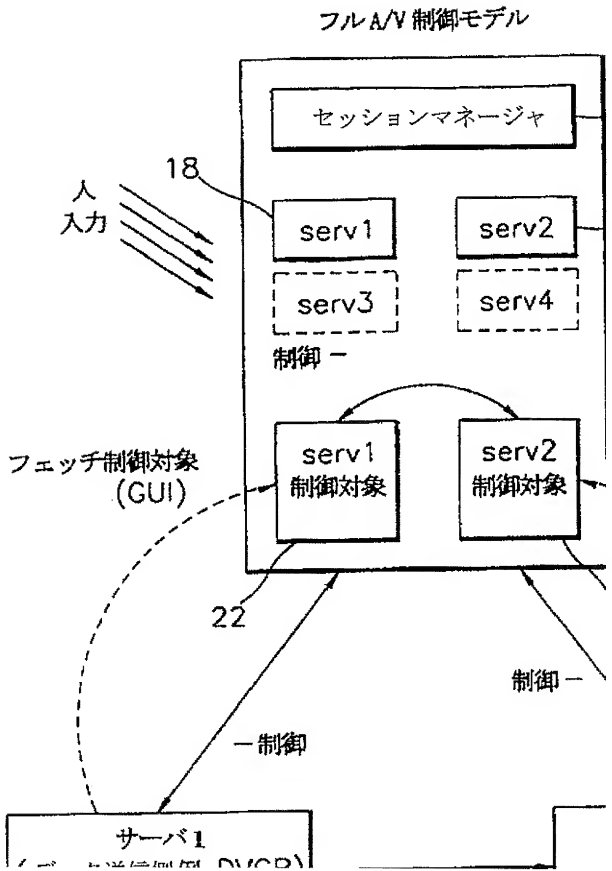
[Drawing 9]


フルA/V制御モデル
セッションマネージャ
18
人
入力
serv1
serv2
serv3
serv4
制御－
フェッチ制御対象
(GUI)
serv1
制御対象
serv2
制御対象
22
制御－
－制御
サーバ1

[Translation done.]

Reference 1

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(87)国際公開番号　ＷＯ９９／５７８３７
(87)国際公開日　平成11年11月11日(1999.11.11)
(31)優先権主張番号　６０／０８４，５７８ Equivalent to Ref. 1
(32)優先日　平成10年５月７日(1998.5.7)
(33)優先権主張国　米国（ＵＳ）

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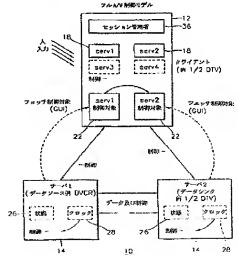
最終頁に続く

(54)【発明の名称】　ネットワークで汎用的にアクセスする命令及び制御情報のための方法及び装置

(57)【要約】
第１ホームデバイスは第１アプリケーションインタフェースデータを貯蔵し、第２ホームデバイスは第２アプリケーションインタフェースデータを貯蔵する。データベースは、データベースデバイスに第１及び第２ホームデバイスのための前記アプリケーションインタフェース説明データを伝送するために第１及び第２ホームデバイスを問い合わせることによって形成される。前記データベースは、データベースデバイスに貯蔵されたり、ネットワークデバイスにより汎用的なアクセスのためのネットワークに接続されたりする。従って、前記第１ホームデバイスのための第１アプリケーションインタフェース説明対象はネットワークを通じてデータベースから第２ホームデバイスに提供される。さらに、前記第２アプリケーションインタフェース説明対象はネットワークを通じてデータベースから第１ホームデバイスに提供される。



【特許請求の範囲】

【請求項１】　ホームネットワーク上でサービスを行うための方法において、

(a) 第１ホームデバイスを前記ホームネットワークに接続する段階と、

(b) 第２ホームデバイスを前記ホームネットワークに接続する段階と、

(c) 複数のアプリケーションインタフェース説明データ対象を含むデータベースを提供する段階として、各アプリケーションインタフェース説明データ対象は前記ネットワークに接続された一つまたはそれ以上のホームデバイスにより構造化されたフォーマットでホームデバイスの命令及び制御のための情報を含む段階と、

(d) 前記第２ホームデバイスが前記データベースで前記第１ホームデバイスのための第１アプリケーションインタフェース説明対象をアクセスする段階と、

(e) 前記第１ホームデバイスが前記データベースで前記第２ホームデバイスのための第２アプリケーションインタフェース説明対象をアクセスする段階と、

(f) 前記ネットワークを通じて前記第２デバイスのために前記アプリケーションインタフェース説明対象を使用して前記第１ホームデバイスから前記第２ホームデバイスに命令及び制御データを伝送する段階と、

(g) 前記ネットワークを通じて前記第１デバイスのために前記アプリケーションインタフェース説明対象を使用して前記第２ホームデバイスから前記第１ホームデバイスに命令及び制御データを伝送する段階を含み、それにより前記第１及び第２ホームデバイスが前記サービスを行うことを特徴とするホームネットワーク上でサービスを提供する方法。

【請求項２】　前記構造化されたフォーマットはXMLフォーマットを含むことを特徴とする請求項１に記載の方法。

【請求項３】　前記(c)段階はデータベースデバイスを前記ネットワークに接続する段階であって、前記データベースデバイスは前記データベースを含むことを特徴とする請求項１に記載の方法。

【請求項４】　(ｉ) 前記第１ホームデバイスは前記第１アプリケーションインタフェースデータを貯蔵し、

（ii）前記第２ホームデバイスは前記第２アプリケーションインタフェースデータを貯蔵し、

（iii）前記(c)段階は、前記データベースデバイスに前記第１及び第２ホームデバイスのための前記アプリケーションインタフェースデータを伝送するために前記第１及び第２ホームデバイスを問い合わせることを含む段階により前記データベースを形成する初期化段階を含むことを特徴とする請求項３に記載の方法。

【請求項５】　前記(d)段階は、ネットワークを通じて前記データベースから前記第２ホームデバイスに前記第１ホームデバイスのための第１アプリケーションインタフェース説明対象を提供する段階を含むことを特徴とする請求項１に記載の方法。

【請求項６】　前記(e)段階は、ネットワークを通じて前記データベースから前記第１ホームデバイスに前記第２ホームデバイスのための第２アプリケーションインタフェース説明対象を提供する段階を含むことを特徴とする請求項１に記載の方法。

【請求項７】　三つまたはそれ以上のホームデバイスを前記ネットワークに接続する段階として、少なくとも一つのホームデバイスは前記ネットワークを通じて複数のホームデバイスに命令及び制御データを伝送するための複数のホームデバイスのアプリケーションインタフェース説明対象を問い合わせるためにデータベースをアクセスする段階をさらに含むことを特徴とする請求項１に記載の方法。

【請求項８】　各アプリケーションインタフェース説明対象は構造化されたフォーマットでデータを含むことを特徴とする請求項１に記載の方法。

【請求項９】　サービスを提供するためのネットワークシステムにおいて、

(a)　相互通信するデバイスにより使われる通信媒体を提供する物理層と、

(b)　第１ホームデバイスと、

(c)　第２ホームデバイスと、

(d)　それぞれのアプリケーションインタフェース説明対象は、前記ネットワークに接続された一つまたはそれ以上の他のデバイスにより構造化されたフォーマットでホームデバイスの命令及び制御のための情報を含む多数のアプリケーショ

ンインタフェース説明データ対象を含むデータベースとを含み、

前記第２ホームデバイスは、前記データベースで前記第１ホームデバイスのための第１アプリケーションインタフェース説明対象をアクセスし前記第１アプリケーションインタフェース説明対象を使用して、前記第２ホームデバイスから前記第１ホームデバイスに制御及び命令データを伝送するためのアプリケーション制御手段を含み、

前記第１ホームデバイスは、前記データベースで前記第２ホームデバイスのための第２アプリケーションインタフェース説明対象をアクセスし前記第２アプリケーションインタフェース説明対象を使用して、前記第１ホームデバイスから前記第２ホームデバイスに制御及び命令データを伝送するためのアプリケーション制御手段を含み、

それにより前記第１及び第２ホームデバイスは前記サービスを行うことを特徴とするサービスを提供するためのネットワークシステム。

【請求項１０】　前記構造化されたフォーマットはXMLフォーマットを含むことを特徴とする請求項９に記載のネットワークシステム。

【請求項１１】　前記データベースを貯蔵するデータベースデバイスをさらに含むことを特徴とする請求項９に記載のネットワークシステム。

【請求項１２】　（ｉ）前記第１ホームデバイスは第１アプリケーションインタフェース説明対象を貯蔵し、

（ii）前記第２ホームデバイスは第２アプリケーションインタフェース説明データを貯蔵し、

（iii）前記データベースデバイスは、データベースデバイスに各々前記第１及び第２アプリケーション説明対象を伝送するために前記第１及び第２ホームデバイスを問い合わせることによって前記データベースを形成することを特徴とする請求項１１に記載のネットワークシステム。

【請求項１３】　前記第２ホームデバイスの制御アプリケーション手段は、前記データベースから第１ホームデバイスのための第１アプリケーションインタフェース説明対象を得ることを特徴とする請求項９に記載のネットワークシステム。

【請求項１４】　前記第１ホームデバイスの制御アプリケーション手段は、前記データベースから第２ホームデバイスのための第２アプリケーションインタフェース説明対象を得ることを特徴とする請求項９に記載のネットワークシステム。

【請求項１５】　少なくとも一つのホームデバイスは、ネットワークを通じて複数のホームデバイスに命令及び制御データを伝送するための複数のホームデバイスのアプリケーションインタフェース説明対象を問い合わせるためにデータベースをアクセスする三つまたはそれ以上のホームデバイスをさらに含むことを特徴とする請求項９に記載のネットワークシステム。

【請求項１６】　それぞれのアプリケーションインタフェース説明対象は構造化されたフォーマットでデータを含むことを特徴とする請求項９に記載のネットワークシステム。

【請求項１７】　前記構造化されたフォーマットはXMLフォーマットを含むことを特徴とする請求項９に記載のネットワークシステム。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】

本発明はネットワークシステム分野に係り、より詳細にはそれに連結された複数のデバイスを具備したホームネットワークに関する。

【０００２】

【従来の技術】

一般的に、ネットワークは通信リンクと前記通信リンクと接続された通信能力を有する多様なデバイスを含む。前記デバイスは、コンピュータ、周辺装置、ルータ、貯蔵装置、そしてプロセッサと通信インタフェースを具備した製品を含む。ネットワークの一実施形態として多様なデバイスが相互接続された家庭用ホームネットワークを挙げられる。普通の家庭はパソコン及び家庭内で典型的に見つけられるホームデバイスを含むいろいろなデバイスを含むことができる。用語としての"デバイス"は、典型的に論理デバイスまたは機能性及びデータを交換する能力を備える他の装置を含み、全てのホームデバイスだけでなく汎用コンピュータも含むことができる。ホームデバイスは保安システム、映画館装備、TV、VCR、ステレオ装備、デジタル衛星サービス(DSS: Digital Satellite Services)とも知られた直接放送衛星サービス(DBSS: Direct Broadcast Satellite Services)、散水システム、照明システム、電子レンジ、食器洗い器、オーブン/ストーブ、洗濯機/乾燥器及び自動車内の処理システムのような電子デバイスを含む。

【０００３】

一般にホームデバイスは家主のライフスタイルと生活水準を向上させるために使われる。例えば、食器洗い器で汚い食器を洗浄することによって、家主が手で直接食器を洗わなくて済む。VCRでは後で家主が特定のプログラムを見るようにTVプログラムを録画できる。保安システムは家主の貴重品を保護し、望ましくない侵入者による家主の不安が軽減される。

【０００４】

家庭用映画館装備のようなホームデバイスは、よく単一の共通制御ユニット、即ち遠隔制御装置を使用して制御される。前記単一の共通制御ユニットは家主が

単一のインタフェースを使用していろいろ他のホームデバイスを制御し命令できるようにする。従って、製造者は単一インタフェースからそのホームデバイスを制御し命令するための制御ユニットを発展させてきた。

【０００５】

ホームデバイスを制御し命令する遠隔制御ユニットの使用に関する短所は各ホームデバイスを制御し命令するための静的な命令ロジックを提供するということである。遠隔制御ユニットの使用に関した他の短所は、既知の遠隔制御ユニットが複数の多様なデバイスを制御できないということであって、より詳細には作業を行ったりまたはサービスを提供するために相互通信するための相異なる互換性を有する複数のデバイスを制御できないということである。

【０００６】

従来のネットワークシステムで、使用者は遠隔制御ユニットまたはデバイス制御パネルを使用して命令を提供する。一応使用者が止めれば、ネットワークで自動操作のための命令を提供する制御ユニットとデバイスがなくなる。使用者が初期にデバイスの第１セットを制御し命令した後、従来のシステムは使用者がデバイスの第２セットを直接制御及び命令せずに作業を行うために必須のことである、ネットワークでデバイスの第２セットと自動で通信するデバイスの第１セットのためのメカニズムを提供しない。さらに、従来のシステムは多様なネットワークデバイスがネットワークで命令及び制御を行うために他のネットワークデバイスに対して情報を得る効率的な方法を提供しない。

【０００７】

【発明が解決しようとする課題】

従って、ホームネットワークでデバイスの動的制御及び命令を提供する方法とシステムが必要である。また作業を行ったりまたはサービスを提供するために相互通信することにおいて相異なる性能を有する複数のデバイスを制御できる能力を提供するための方法及びシステムが必要である。また多様なネットワークデバイスがさらに他の多様なネットワークデバイスを自動で命令し制御する能力を提供するための方法及びシステムが必要である。またデバイス間通信のために汎用的にアクセスする命令及び制御情報を提供するための方法及びシステムが必要で

ある。

【０００８】

【課題を解決するための手段】

本発明はこの必要性を満たす。第１実施形態で本発明はホームネットワーク上でサービスを行うための方法及びシステムにおいて、第１及び第２ホームデバイスを前記ホームネットワークに接続する段階と、複数のアプリケーションインタフェース説明データ対象を含むデータベースを提供する段階として、各アプリケーションインタフェース説明データ対象は前記ネットワークに接続された一つまたはそれ以上のホームデバイスにより構造化されたフォーマットでホームデバイスの命令及び制御のための情報を含む段階と、第２ホームデバイスが前記データベースで前記第１ホームデバイスのための第１アプリケーションインタフェース説明対象をアクセスする段階と、前記第１ホームデバイスが前記データベースで前記第２ホームデバイスのための第２アプリケーションインタフェース説明対象をアクセスする段階と、前記ネットワークを通じて前記第２デバイスのために前記アプリケーションインタフェース説明対象を使用して前記第１ホームデバイスから前記第２ホームデバイスに命令及び制御データを伝送する段階と、前記ネットワークを通じて前記第１デバイスのために前記アプリケーションインタフェース説明対象を使用して前記第２ホームデバイスから前記第１ホームデバイスに命令及び制御データを伝送する段階とを含む。それにより前記第１及び第２ホームデバイスは前記サービスを行う。

【０００９】

本発明の一形態で、前記第１ホームデバイスは第１アプリケーションインタフェースデータを貯蔵し、前記第２ホームデバイスは第２アプリケーションインタフェースデータを貯蔵する。前記データベースは、前記データベースデバイスに第１及び第２ホームデバイスのための前記アプリケーションインタフェース説明データを伝送するために第１及び第２ホームデバイスを問い合わせることによって形成される。前記データベースは、データベースデバイスに貯蔵されたり、ネットワークデバイスにより汎用的なアクセスのためのネットワークに接続されたりする。従って、前記第１ホームデバイスのための第１アプリケーションインタ

フェース説明対象はネットワークを通じてデータベースから第２ホームデバイスに提供される。さらに、前記第２アプリケーションインタフェース説明対象はネットワークを通じてデータベースから第１ホームデバイスに提供される。

【００１０】

さらに、三つまたはそれ以上のホームデバイスはネットワークに接続され、少なくとも一つのホームデバイスはネットワークを通じて複数のホームデバイスに命令及び制御データを伝送するための複数のホームデバイスのアプリケーションインタフェース説明対象を問い合わせるためにデータベースをアクセスする。各アプリケーションインタフェース説明対象は構造化されたフォーマットでデータを有する。前記構造化されたフォーマットはXMLフォーマットを有する。

【００１１】

このような本発明の特徴、観点及び利点は次の詳細な説明、請求項及び添付した図面によりさらによく理解されるはずである。

【００１２】

【発明の実施の形態】

一観点で、本発明はホームネットワークのようなネットワークでデバイス間通信を提供する。ホームデバイスがより知能的になって情報を共有できるようになれば、デバイス間通信は使用者が前記デバイスの情報共有性能を用いられるようにネットワーク内のデバイスを相互接続することを許容する。同じように、デバイス間通信は使用者にネットワークに連結されたデバイスを充分柔軟に使用する能力を与えることにおいて決定的な役割をする。

【００１３】

図１を参照すれば、本発明の一実施形態で、ネットワーク１０は通信リンク１６を通じて相互連結された少なくとも一つのクライアントデバイス１２及び少なくとも一つのサーバデバイス１４を含む。通信リンク１６は、多様に連結されたホームデバイス間でデータを伝送し受信するために物理的階層(媒体)を提供する１３９４シリアルバスを含むことができる。前記１３９４シリアルバスは、時間－多重化オーディオ/ビデオ(A/V)ストリーム及び標準IP(Internet Protocol)通信を両方とも支援する。実施形態で、ホームネットワークはホームネットワーク

のための通信階層としてIPネットワーク階層を使用する。しかし他の通信プロトコルがホームネットワークに通信を提供するために使われる場合もある。

【００１４】

各クライアントデバイス１２は、ネットワーク１０内の一つまたはそれ以上のサーバデバイス１４と通信できる。さらに、各サーバデバイス１４は、ネットワーク１０で一つまたはそれ以上の他のサーバデバイス１４、そして一つまたはそれ以上のクライアントデバイス１２と通信できる。各クライアントデバイス１２は、使用者入力を受信するためのマウスとキーボードのような入力装置を使用者がネットワークに連結されたデバイスと相互作用するように制御使用者インタフェースを提供するディスプレイを含む使用者通信インタフェースを含むことができる。使用者インタフェースは、使用者に情報を提供するためのGUI(Graphical User Interface)ディスプレイ１８を含むことができる。図２を参照すれば、ここに定義されたように、各サーバデバイス１４は使用者に制御使用者インタフェースを除外したサービスを提供し、各クライアントデバイス１２はネットワーク１０と相互作用する使用者のために制御使用者インタフェースを提供する。このようにしてクライアントデバイス１２だけが使用者と直接相互作用し、サーバデバイス１４はクライアントデバイス１２及びサーバデバイス１４とのみ相互作用する。例えば、サービスはMPEGソーシング/シンキング及びディスプレイサービスを含むことができる。

【００１５】

図３は、多数のクライアントデバイス１２及び多数のサーバデバイス１４を含むホームネットワーク１０の例を示すブロック図である。各サーバデバイス１４は、ネットワークで使用者にサービスを提供するための資源としてハードウェアを含むことができる。さらに各サーバデバイス１４はサーバハードウェアを制御するためのサーバまたはサービス制御プログラム２０を貯蔵することができ、図４に示したようにサーバ制御プログラム２０と共に使用者インタフェースのためのグラフィック制御対象(GCO: Graphical Control Object)使用者インタフェース説明書２２を含むことができる。

【００１６】

制御クライアントデバイス１２と制御されたサーバデバイス１４との間の制御のために、クライアントデバイス１２は、例えばネットワークを通じてサーバデバイス１４からクライアントデバイス１２にGCO２２を伝送することによってサーバデバイス１４のGCO２２をアクセスする。その後、クライアントデバイス１２は、ネットワークを通じてクライアントデバイス１２からサーバデバイス１４の制御プログラム２０と通信を行う使用者のための制御使用者インタフェースGUI１８を創出するために伝送されたGCO２２を使用する。使用者は少なくともクライアントデバイス１２からサーバデバイス１４の制御プログラム２０に制御と命令を提供する。

【００１７】

サーバデバイス自体で各サーバデバイス１４のGCO２２貯蔵は、いくつかのサーバデバイス１４と共にネットワークでクライアントデバイス１２のプロセシングと貯蔵要求を緩められる。さらに、サーバデバイス１４でGCO２２を貯蔵することは、各サーバデバイス１４が使用者にその自体のGUI形態と感じを提供することを許容し、クライアントデバイス１２で修正なしにGCO２２の修正または更新を許容する。

【００１８】

実施形態でクライアントデバイス１２とサーバデバイス１４との間の命令及び制御を提供する図４を参照すれば、前記クライアントデバイス１２は、クライアントデバイス１２に貯蔵されたり希望のサーバデバイス１４からネットワークを通じてクライアントデバイス１２に伝送されたGCO２２を使用してGUI１８をディスプレイするためのレンダラ(Renderer)２４を含むことができる。例えば、初期のデバイス選択状態で、前記クライアントサーバ１２はネットワークを通じて少なくとも一つのサーバデバイス１４のGCO２２をフェッチでき、前記レンダラ２４は前記サーバデバイス１４を制御するためにGCO２２を使用してGUI１８をディスプレイする。望ましくは、前記GUI１８はサーバデバイス１４でカスタマイズされ、サーバデバイス１４を制御するために作られた内蔵命令セットを含むことができる。

【００１９】

また、多様なサーバデバイス１４のGUI１８は、例えば：（１）GUI１８をディスプレイするクライアントデバイスレンダラ２４のための共通GCOモデルタイプ、（２）多様なサーバデバイス１４からクライアントデバイス１２にGCO２２を伝送するための共通通信プロトコル、（３）制御される特定サーバデバイス１４の対応するサーバデバイス１４の制御プログラムで作られた知識を求めないクライアントデバイス１２から対応するサーバデバイス１４の制御プログラム２０にGUI相互作用のための共通通信プロトコルのような共同体を含むことができる。

【００２０】

再び図４を参照すれば、サーバデバイス１４は、サービスを提供するためにサーバハードウェアを制御する一つまたはそれ以上のサーバ制御プログラム２０を含むことができる。前記サーバデバイス１４のGCO２２からGUIインタフェース１８はサーバデバイス制御プログラム２０にインタフェースを提供する。前記サーバデバイス１４は、求められたサービスを提供することにおいてサーバデバイス１４及びサーバデバイスハードウェアの制御状態を指摘する制御状態データ２６を含むことができる。

【００２１】

例えば、制御状態データ２６は、VCRサーバデバイスで録画動作を行うために設定されるタイマー設定のように、サーバデバイス１４のためにGUI１８で制御情報の状態を含むことができる。制御状態データ２６は制御されたサーバデバイス１４に貯蔵され、サーバデバイス１４の使用者制御のために制御クライアントデバイス１２でサーバデバイス１４のGUI１８を通じて使用者にディスプレイされる。望ましくは、前記サーバデバイス１４のGUI１８をディスプレイするための制御クライアントデバイス１２は、制御されたサーバデバイス１４のための制御状態データ２６の知識を維持しない。

【００２２】

各サーバデバイス１４は一つまたはそれ以上のクライアントデバイス１２により制御される。従って、前記サーバデバイス１４に貯蔵された制御状態データ２６は、各制御クライアントデバイス１２でサーバデバイス１４のGUI１８内の情報状態を含む。例えば、使用者が第１クライアントデバイス１２を使用してサー

バデバイス１４を制御する時、使用者制御が完成されれば、第１クライアントデバイス１２でサーバデバイス１４のGUI１８内の情報はサーバデバイス１４によりサーバデバイス１４の制御状態データ２６に貯蔵される。

【００２３】

一方では、使用者が第１クライアントデバイス１２でサーバデバイス１４のGUI１８と相互作用する間、前記サーバデバイス１４の制御状態データ２６は第１クライアントデバイス１２でサーバデバイス１４のGUI１８内の情報に更新され、使用者制御が完成されれば、前記制御状態データ２６はサーバデバイス１４で維持される。使用者が第２クライアントデバイス１２を使用してサーバデバイス１４を制御する時、前記制御状態データ２６は後続する制御のために第２クライアントデバイス１２でサーバデバイス１４のGUI１８を通じて使用者が用いることができるように作られる。使用者はまた以後にサーバデバイス１４を制御するために第１クライアントデバイス１２を使用でき、ここで前記制御状態データ２６は後続する制御のために第１クライアントデバイス１２でサーバデバイス１４のGUI１８を通じて使用者が用いることができるように作られる。前記サーバデバイス１４はまたクロック２８を含んだり、後述されるように使用者から入力された時間またはクロックに基づいた時間遅延作用を許容するために現在時間を維持できる。

【００２４】

クライアントデバイス１２とサーバデバイス１４は、例えばDTVのように一つのユニットで物理的に一緒に結びつけることができる。その場合に、前記サーバデバイス１４はサーバハードウェアを制御するための制御プログラム２０を含み、前記クライアントデバイス１２は少なくともサーバハードウェアの制御及び命令のためにサーバ制御プログラム２０に制御使用者インタフェースを提供する。図５はクライアントデバイス１２の例を示す図面であって、（１）GUIディスプレイのためのPDA(RemoteC)、（２）GUIをディスプレイし、オーディオ及び/またはビデオプログラムストリーム目的地サーバで構成されたシンクサーバを含むDTV(STB)、（３）GUIをディスプレイし、多重のサービスを提供するために少なくとも一つのサーバデバイスを含むPCを含むことができる。DTVまたはPCクライアント

デバイス内のハードウェアあるいは実行できるものは他のクライアントデバイスによっても制御される。図６はサーバデバイス１４の例を示す図面であって、（１）ソースサーバデバイスとしてのDVDP SmartCard、（２）シンクサーバデバイスとしてのオーディオ増幅器、（３）ソースまたはシンクサーバデバイスとしてのDVCR、（４）遠隔サーバデバイスを管理するための管理サーバを含む。前記管理サーバは例えばDSB-STB、ケーブルTV-STB、またはATSC-STBを含むことができる。このようなデバイスはSTB内部作業のローカル制御または管理のための管理サーバを含む。さらに、外部ネットワークを通じてアクセスされた外部サーバは、例えばVideo-on-Demand、Enhanced-TV及びインターネット商取引のようなサービスのためにローカルクライアントデバイスにより使われる場合がある。

【００２５】

図７を参照すれば、二つのサーバデバイス１４間の通信及び制御は、それら間の命令語及び制御データを通信するサーバデバイス１４の制御プログラム２０により行われる。サーバデバイス１４はネットワークを通じて一つまたはそれ以上の他のサーバデバイス１４を制御できる。そして、サーバデバイス１４は一つまたはそれ以上のサーバデバイス１４、そして一つまたはそれ以上のクライアントデバイス１２により制御される。さらに、使用者はサーバデバイス１４の第１セットを制御及び命令するためにクライアントデバイス１２を使用でき、前記サーバデバイス１４の第１セットは、使用者にサービスを行うために必須のものであって、使用者を惑わせずにサーバデバイス１４の第２セットを自動で命令し制御できる。

【００２６】

例えば、自動時間－遅延動作を行うために、使用者はサーバデバイス１４の第１セットを制御するクライアントデバイス１２に"ログオン"し、希望のサービスを指定できる。それから使用者は前記クライアントデバイス１２から"ログオフ"する。サーバデバイス１４の第１セットはそれら自体間で通信及び制御を行い、その後に第１セットで一つまたはそれ以上のサーバデバイスが使用者の介入なしに希望のサービスを総括的に提供するために必須のものであって、サーバデバイス１４の第２セットを自動で制御する。

【００２７】

図７は、二つのサーバデバイス１４が相互通信し制御する実施形態を示す図面である。各サーバデバイス１４は前述された制御プログラム２０、クロック２８及び前述した制御状態データ２６を含む。各サーバデバイス１４はまたサーバデバイス１４がクライアントデバイス１２により直接制御されるようにするGCO２２を含むことができる。しかし、GCO２２はクライアントデバイス１２により直接制御されなく、ただ他のサーバデバイス１４と通信するサーバデバイス１４には含まれる必要がない。各サーバデバイス１４はまた命令語(CL: Command Language)インタフェース３０及び命令語ライブラリを含む。前記命令語ライブラリは、前記サーバデバイス１４がそのサービスを提供するために情報を送信及び受信するのに使用する命令を含む。しかし、図４及び前述されたように命令語は使用者制御のために必ず必要なものではない。

【００２８】

図８は、ネットワークでソースサーバデバイス１４、シンクサーバデバイス１４、そしてクライアントデバイス１２を含むオーディオ/ビデオ(A/V)モデルの例を示す。前記ソースサーバデバイス１４はソースサーバデバイス１４のデータストリームソースハードウェア３２を制御するための制御プログラム２０を含み、前記シンクサーバデバイス１４はシンクサーバデバイス１４のデータストリームシンクハードウェア３４を制御するための制御プログラム２０を含む。例示的な動作で、使用者はデータストリームソースハードウェア３２を稼動させるためにソースサーバデバイス１４を制御し、データストリームシンクハードウェア３４を稼動させるためにシンクサーバデバイス１４を制御するクライアントデバイス１２を使用する。データストリームソースハードウェア３２からデータストリームシンクハードウェア３４へのデータ伝送を初期化することにおいて、使用者は前記クライアントデバイス１２を諦める。他の一方では、使用者は将来の初期データ伝送をプログラムでき、クライアントデバイス１２を諦める。以後でソースサーバデバイス１４のデータストリームソースハードウェア３２とシンクサーバデバイス１４のデータストリームシンクハードウェア３４は使用者によりプログラムされた時間に自動でデータ伝送を初期化する。

【００２９】

例えば、前記データストリームソースハードウェア３２は、直接衛星放送(DBS：Direct Broadcast Satellite)のようなチューナーアクセスデバイスを含むことができる。DBSはケーブルテレビに代える多重チャンネルであって、衛星から直接的に小さな衛星円盤(直径３フィート１８インチ)にケーブルのようなテレビプログラミングを提供する。DBSと共に、いくつかの標準アナログテレビ信号は単一衛星トランスポンダでデジタル的に圧縮され、空中の指定された場所に位置した衛星円盤も２００つ以上のチャンネルが受信することを許容する。前記データストリームシンクハードウェア３４は、再生時に圧縮されたデジタルビデオ信号をデコーディングできる命令及びデジタルビデオカセットレコーダ(DVCR)を含むことができる。使用者はDVCRのための"時間－遅延録画"イベントデータとチューナーアクセスデバイスのための"時間－遅延選択プログラム"イベントデータを含む命令及び制御データを提供する。時間遅延後に前記チューナーアクセスデバイスは希望のプログラムを選択し、使用者から追加的な制御操作なしでもプログラムデータを受信及び録画するDVCRにソースプログラムデータを提供する。

【００３０】

図９は、少なくともネットワークでソースサーバデバイス１４ SERVER１、シンクサーバデバイス１４ SERVER２とクライアントデバイス１２を含むさらに他のA/Vモデルを示す図面である。前記クライアントデバイス１２は、サーバデバイス１４ SERVER１及びSERVER２と他のサーバデバイス１４、例えばSERVER３及びSERVER４(図示せず)を選択し制御するために、使用者のための選択情報をディスプレイする使用者インタフェースのある管理者３６を含む。選択情報はサーバデバイス１４ SERVER１、SERVER２、SERVER３及びSERVER４を各々選択する使用者のためにセッション管理者３６でServ１、Serv２、Serv３及びServ４に割当てられたアイコンシンボルを含む。前記ソースサーバデバイス１４ SERVER１はDVCRを含むことができ、前記シンクサーバデバイス１４ SERVER２は１/２DTVを含むことができる。

【００３１】

動作の一例として、サーバデバイス１４ SERVER１とSERVER２の選択において

、前記クライアントデバイス１２は各サーバデバイス１４のGCO２２をクライアントデバイスに伝送し各サーバデバイス１４ SERVER１及びSERVER２に対応するGUI１８をディスプレイする。使用者は、サービスのために対応するサーバデバイス１４に制御と命令を提供する各サーバデバイス１４のGUI１８と相互作用できる。各サーバデバイス１４は単独または他のサーバデバイス１４と組合してサービスを提供できる。さらに、前記セッション管理者３６は、サービスを行うために対応するサーバデバイス１４が必要とするものであって、前記クライアントデバイス１２で前記サーバデバイス１４のGUI１８間に制御状態データ２６を伝送する。使用者制御と命令情報に基づいて、二つ以上のサーバデバイス１４は使用者が求めるサービスを提供するためにそれら間で命令及び制御情報を通信できる。

【００３２】

前記セッション管理者３６は、ネットワーク１０で多様なサーバデバイス１４により提供される有用なホームネットワークサービスをアクセスしディスプレイする機能を有するソフトウェアエージェントを含むことができる。前記ソフトウェアエージェントは付加的にネットワーク１０で多様なサーバデバイス１４の性能を整合させ、互換性能を有する前記サーバデバイス１４だけのための選択情報をディスプレイする。さらに、セッション管理者３６は、使用者がサーバデバイス１４に意味のある命令及び制御情報を提供するように一つのサーバデバイス１４のGUI１８で作られた選択と、他のサーバデバイス１８のGUI１８で作られた選択を整合させられる。

【００３３】

動作のさらに他の例で、セッション管理者３６はネットワークを検索し、ネットワークに接続されたサーバデバイス１４を見つけるソフトウェアエージェントを実行する。前記ソフトウェアエージェントは、またサーバデバイス１４の性能を決定するために各サーバデバイス１４に貯蔵された性能データをアクセスし、使用者にその性能に対する情報を提供する。それから前記セッション管理者３６は、図９に示したようにサーバデバイスSERVER１、SERVER２、SERVER３及びSERVER４のための選択アイコンServ１、Serv２、Serv３及びServ４をディスプレイす

る。

【００３４】

前記セッション管理者３６は、使用者が４個の全てのアイコン中で選択できるように初期に全ての選択アイコンServ１、Serv２、Serv３及びServ４をイネーブルさせる。使用者がServ１選択アイコン上でクリックしてサーバデバイスSERVER１を選択した後に、前記セッション管理者３６はサーバデバイスSERVER３及びSERVER４がサーバデバイスSERVER１と性能上互換できないと決定する。従って、前記セッション管理者３６はサーバデバイスSERVER３及びSERVER４のために選択アイコンServ３及びServ４を各々ディスエーブルさせる。それから使用者はサーバデバイスSERVER２を命令及び制御するためにアイコンServ２上でクリックできる。

【００３５】

使用者が選択されたサーバデバイス１４のGUI１８と相互作用することのように、使用者により各GUI１８に入力された制御及び命令情報は使用者により後続するサーバデバイス選択に影響を及ぼす付加的な性能情報を提供する。例えば、もしVCRサーバデバイス１４が選択されれば、他のサーバデバイス１４のための選択アイコンをイネーブルまたはディスエーブルさせることにおいて、セッション管理者３６による後続の操作が再生または録画する使用者の決定により影響される。

【００３６】

ネットワークで各サーバデバイス１４は、図９に示したサーバデバイスに関した例を通じて前述されたように一つまたはそれ以上のサービス性能を有する。各サービス性能は情報のソーシングまたはシンキングを含む。例えば、TVはビデオ及びオーディオストリームを受信するシンキング性能を有し、VCRはビデオ及びオーディオ信号をソース(伝送)及びシンク(受信)でき、PCはビデオ、オーディオそしてデータを伝送及び受信できる。各ソーシング性能は相補的で互換的なシンキング性能を有する。これと類似に、各シンキング性能は相補的で互換的なソーシング性能を有する。例えば一つのデバイスでビデオ出力性能はさらに他のデバイスのビデオ入力性能により補完される。

【００３７】

各デバイス１４はネットワーク上でいろいろな他のサービスのためにソースまたはシンクされるので、図１０に示したように各デバイス１４は性能データテーブル(性能テーブル１)を貯蔵する。テーブル１の第１列はデバイス１４のサービス性能を確認し、第２列は第１列に対応するサービスのために前記デバイス１４がソースかシンクかをを確認する。新たなサービスはさらに古いデバイスと互換性を維持する間に性能データテーブル１を使用して実行される。例えば、もしさらに古いサービスと互換される新たなサービスが開発されるならば、新たなサービス及び古いサービス両方とも実行デバイスは古いサービスを使用する古いデバイスと互換性を維持するにつれて、前記新たなサービスを行うデバイスのための性能データテーブル１に書き込まれることができる。

【００３８】

第１実施形態で、デバイス管理者はソース及びシンクサービスデバイスのマッチングまたは比較を行う。例えば、前記デバイス管理者は互換性マッチングと共に多様なデバイス１４及び指定されたデバイス１４の性能及び特性を比較するソフトウェアエージェントの役割も行える。例えば、サービスがネットワークにわたって第１デバイス１４から第２デバイス１２までメディアストリームの場合、前記デバイス管理者は使用者が第１デバイス１４の性能と互換される第２デバイス１４を分別力あるように選択できるように第１及び第２デバイス１４の性能を比較する。次はサーバデバイス１４の実施形態のためのサービス性能リストの例を示す。

```
Stream_format_video_dv
Stream_format_video_mpeg2tpt
Stream_format_video_dsstpt
Stream_format_video_mpeg2pes
Stream_format_video_mpeg210901-tpt
```

【００３９】

図１１に示したように、各デバイス１４はデバイスに関した特性を含む特性データテーブル(特性テーブル２)をさらに貯蔵する。名称と値段はテーブル２で各

特性を定義する。文字長さがテーブル２に示されているが、必要ではない。前記特性データはネットワーク１０上で情報処理相互運用を容易にしデバイス情報を貯蔵する他のデバイス１４に有用である。例えば、後述されるようにデバイスページはデバイス名称を貯蔵する特性テーブル２を使用する。他のフィールドは必要な時特性データテーブル２に追加されることができる。

【００４０】

前述された使用者－クライアントデバイス制御モデルで、特性データはクライアントデバイス１２でサーバデバイス１４のGUIページ上にディスプレイされる。他には、前記特性データをディスプレイするために第２レベルデバイス情報ホームページが使われる場合がある。さらに、テキストまたはXML(Extensible Markup Language)ファイルの形態の特性データがソフトウェアエージェントによりアクセスされる場合がある。デバイス－デバイス制御モデルのために、制御されたデバイスのための特性データはデバイスインタフェース及びアプリケーションインタフェースに貯蔵される。

【００４１】

特性テーブル２で前記デバイス位置特性フィールドは各デバイス１４のための位置またはグループを貯蔵するために使われる。デバイスタイプ特性フィールドはVCR、DVD、DTV、カムコーダ、PC、保安システムのような特定のデバイス１４のためのデバイスタイプを書き込む。前記デバイスタイプ特性フィールドは、もしデバイス自体がデバイスアイコンを供給しないならば、デバイスページでデバイスを表現するデフォルトデバイスアイコンを選択するために使われる。特性テーブル２はデフォルトソース及びデフォルトシンク特性フィールドのための多重の書き込みを含むことができる。そのようなそれぞれの書き込みは、デバイス１４により処理される各データタイプのための他のデフォルトソースまたはシンクデバイス１４を表現する。

【００４２】

望ましくは、性能及び特性データは階層言語を使用して構造化されたデータでパッケージされる。これはGCO伝送及びサーバデバイス－サーバデバイス制御のような他の目的で使われた性能と特性を回復させる共通方法を提供する。例えば

、特性データは次の構造化されたデータフォーマットを含むことができる。

＜DEVICEATTRIBUTES＞

＜ATTRIBUTE name＝DeviceManufacturer value＝"Samsung Inc."＞

＜ATTRIBUTE name＝ManufacturerURL value＝www.Samsung.com＞

＜ATTRIBUTE name＝ManufacturerIcon value＝"logo.gif"＞

＜ATTRIBUTE name＝DeviceName value＝"Samsung DSS"＞

＜ATTRIBUTE name＝DeviceModel value＝"SCH1900"＞

＜ATTRIBUTE name＝DeviceType value＝DDS＞

＜ATTRIBUTE name＝DeviceLocation value＝"Livingroom"＞

＜ATTRIBUTE name＝DeviceIcon value＝"device.gif"＞

＜ATTRIBUTE name＝DeviceAddress value＝105.144.30.17＞

＜/DEVICEATTRIBUTES＞

【００４３】

一例として、性能データは次の構造化されたフォーマットを含むことができる。

＜DEVICECAPABILITIES＞

＜CAPABILITY type＝MPEG2 value＝Source＞

＜CAPABILITY type＝MPEG2 value＝Sink＞

＜CAPABILITY type＝MPEG3 value＝Source＞

＜CAPABILITY type＝MPEG3 value＝Sink＞

＜/DEVICECAPABILITIES＞

【００４４】

アプリケーションインタフェース言語は、他のサーバデバイス１３がサーバデバイスーサーバデバイスを含んでデバイスーデバイス制御を行うように使われる。前記アプリケーションインタフェース言語は命令語を含み、後述されたようにXMLを使用して記述されることができる。一つのサーバデバイス１４の制御プログラム２０は、GUI１８を使用しないとかまたは使用者の介入なしにネットワークを通じてさらに他のサーバデバイス１４の制御プログラム２０を遠隔で制御する。デバイスーデバイスの制御の例は自動操作である。使用者は初期に希望のサ

ービスのためにクライアントデバイス１２を通した制御を提供し、次いで二つ以上のサーバデバイス１４がサービスを提供するために使用者の相互作用なしでもお互い自動で通信し制御する。

【００４５】

図１２及び図１３を参照すれば、望ましくは標準アプリケーションインタフェース言語が、多様なサーバデバイス１４内の多様な制御プログラム２０間で情報処理相互運用を許容するように使われる。一実施形態で、前記標準アプリケーションインタフェース言語は、次のような構成ブロックの（１）サービス機能データベースのようなサービスの機能的規格ブロック４０、（２）メッセージ要素が構成されるブロック（４２）、（３）産業標準フォーマットブロック４４、（４）メッセージ圧縮ブロック４６及び構造化されたメッセージデータを出力するメッセージ文字列構成ブロック４８を含む。

【００４６】

図１２は、命令メッセージ発生機能を行う構成ブロックの構成例を示す図面である。各メッセージアイテムはサービスの機能的規格で構成され、メッセージアイテムに対して産業標準圧縮形態(Hex)ラベルを選択することによって標準化される。メッセージアイテムのようなグループは完全な命令文字列を作るために組合される。CAL及びAV/Cのように存在する命令語は図１２に示したように動作する。しかし、その命令語メカニズムは物理的なインタフェース上で物理的装置に対して２進コードまたは１６進コードメッセージ及びシステム作動を規定しハードウェア規定に基づく。従って、その命令語は、制御器デバイス１４内の一つのソフトウェアアプリケーションプログラム２０がネットワーク上の制御されたデバイス１４内のさらに他のソフトウェアアプリケーション２０の位置を指定し制御するアプリケーションレベル、即ち、ソフトウェアレベルで、名称、アドレス、デバイス性能発見、通信言語そして命令メッセージを含む制御システム規格の制御メカニズムに基づいたネットワーク階層に対してあまり望ましくはない。前記制御メカニズムはコンピュータのような多用途、多重アプリケーションデバイスだけでなくDVCRのような装置を含むデジタル装置のようなデバイスに対してさらに適している。

【００４７】

図１３は、命令メッセージ発生機能を行う図１２の構成ブロックの望ましい例を示す図面である。図１３で、産業標準化フォーマット４４とメッセージ圧縮４６の位置が図１２と違う。多数のテキスト標準化様式は完全なメッセージを作る機能的規格サービス４０から選択される。後で前記メッセージはプロトコルスタックの下部階層により圧縮されたりする。図１３は、電化製品CEに対してサービスまたはデバイス命令及び制御を行う方法を表す。メッセージ構成はXML標準化シンタックスにより定義され、メッセージ圧縮はHTTPのようなさらに他のプロトコル階層により行われる。命令インタフェース言語は下位ハードウェアレベルよりはアプリケーションソフトウェア２０インタフェースレベルで使われる。従って、ネットワークプロトコルスタックは前記言語内の命令により管理され、各制御器デバイス１４と制御されたデバイス１４はこれら間のメッセージ伝送のためにネットワークの統合された構成として示される。

【００４８】

図１４を説明すれば、クライアントデバイス１２とサーバデバイス１４との間の三つの相互作用の三つの実施形態を示す。第１実施形態"A"で、使用者は遠隔サービスアプリケーション"S"と通信する。前記使用者は使用者インタフェースとしてクライアントデバイスでブラウザを使用するが、ここで前記ブラウザはサービスアプリケーション"S"でサービスプログラム２０を制御しHTML(Hyper Text Markup Language)またはXMLフォーマットで応答を受信する.XML基盤の非同期命令メッセージポスティングを受け入れるブラウザを備えた第二サーバが含まれる。例えば、DVCRにおいて第二サーバ１４は"VCR FAILED:TAPE BROKE"のような命令メッセージを受け入れる。ブラウザを含むソフトウェアエージェントは使用者による後続アテンションとDVCRの制御のためにブラウザのGUI内で使用者のための命令メッセージがディスプレイするために用いられる。望ましくは、XML基盤のクライアントデバイス１２は、サーバデバイス対サーバデバイス制御と命令のために他所で初期化された命令に応答するHTTP１．１サーバ性能を含む。

【００４９】

第２実施形態"B"で、使用者はソフトウェアクライアント制御プログラム５０

により取り替えられる。前記ソフトウェアクライアント制御プログラム５０はXML基盤のサービスアプリケーション"S"への命令ポスティングを生成し、返信されるXML命令ポスティングを受信する。そして、第３実施形態"C"で、前記ソフトウェアクライアント制御プログラム５０は、命令と応答が二つのサービスアプリケーション２０間で交換されるサーバデバイス制御プログラム２０のようなアプリケーションにより取り替えられる。この点において、実施形態"B"はナル(Null)サービスを有する実施形態"C"の特別な場合である。

【００５０】

XMLに基づいたアプリケーションインタフェース言語は、ワールドワイドウェブあるいはインターネットによりイネーブルされるデバイスまたはサービスのために第１サーバデバイス１４と第２サーバデバイス１４(デバイス－対－デバイスまたはサービス－対－サービス)間を制御するために使われる。アプリケーションインタフェース言語はウェブ標準、ミドルウェア階層に基づく。一実施形態で、デバイス－デバイス制御はネットワーク１０でさらに他のサーバデバイス１４から一つのサーバデバイス１４で制御プログラム２０またはアプリケーションを遠隔で制御することを含む。従って、アプリケーション２０に対するインタフェース(API)はAPI拡張を使用するネットワークを通じて利用できる。望ましくは、前記API拡張は全体の情報処理相互運用を提供するためにXMLに基づいたインタフェースのような標準フォーマットを使用する。

【００５１】

なお、図１５は、ネットワーク内で通信するサービスAとしてデザインされた第１アプリケーションAとBとしてデザインされた第２アプリケーションBのためのAPI拡張を示すブロック図である。例えばサービスAはネットワークで第１サーバデバイスAのための制御プログラムであり、サービスBはネットワークで第２サーバデバイスBのための制御プログラムでありうる。サーバデバイスBはサーバデバイスAに命令を伝送する。例えば、第１及び第２サービスデバイスA及びBはCEデバイスを含む。

【００５２】

サービスAのためのAPI拡張を参照すれば、第１最上位ブロック５２は、CEデバ

イスを説明する英単語を使用してCE対象及び方法の総合的な定義またはデータベースを提供する。前記総合的な定義またはデータベースはC、XMLまたは対象及びそれら各自の方法を表現できる他のフォーマットでも存在できる.XMLを使用する総合的な定義またはデータベースはXCE定義と呼ばれる。第２ブロック５４は、インタフェースデータタイプ定義INTERFACE.DTDでデザインされた全てのデバイス１４のためにXML形式でAPIを表現するフォーマットを提供する。

【００５３】

手段Aでデザインされたソフトウェアエージェントはサービスのための XCE定義のサブセットを使用し、XML形態文書を生成するサービスAのためのインタフェースデータタイプINTERFACE.DTD、INTERFACE-A.XMLを使用する。前記文書INTERFACE-A.XMLはサービスAのための文書タイプ定義INTERFACE.DTDに従ってサービスAにより支援される対象及び方法を説明する。他のデータタイプ定義はまたINTERFACE-A.XML文書を作成するために使われる。

【００５４】

ソフトウェア手段Aはまたネットワークインタフェース上で、サービスBから例えばCでプログラムされたサービスAまでXMLメッセージから変換されたルックーアップテーブル５６及び実行できる２進数にコンパイルされたルックーアップテーブル５６を生成する。望ましくは、ルックーアップテーブル５６はコンパイル時に作成され、ここでランータイムの間、サービスBから入力されるXML形態の方法(Method)メッセージ(命令)がサービスAのためにコンパイルされたアプリケーションCコードにより作成されたAPI形式に変換される。前記ルックーアップテーブル５６はXML対象方法要請サービスとしてAのための装置固有の要請に変換するランータイム翻訳を提供する。ルックーアップテーブル５６はサービスAのためにサーバデバイスA上で局部的な実行のためのデバイス制御プログラム２０と共にコンパイルされる。

【００５５】

INTERFACE-A.XMLは受信されたメッセージでエラーが発生した時正当性チェックのためにサービスAにより使われたりする。INTERFACE-A.XMLはまたサービスAと通信する前にサービスAのためのメッセージフォーマットを決定するサービスB

のような外部アプリケーションにより使われたりする。さらに、もしサービスBからサービスAへのメッセージがエラーを発生させれば、サービスBはエラーを診断するためにINTERFACE-A.XML文書をアクセスできる。

【００５６】

サービスBに対するAPI拡張を参照すれば、前記第１ブロック５８は前記のサービスAのためにXCE定義のようなCE対象の総合的な定義またはデータベースを提供する。次のブロック６０はサービスAのためのAPIのような遠隔のAPIサービスまたはデバイスにXML形態方法(命令)呼び出しのための言語定義を提供する。前記言語定義はネットワーク上で対象との相互作用を説明する文書タイプ定義方法要請CALL.DTDである。

【００５７】

手段Bでデザインされたソフトウェアエージェントは、命令をサービスBのためにコンパイルされたCプログラムコードをXML形式の方法要請に変換するルックアップテーブルを作成するために、少なくともサービスBのためのXCE規定内の対象及び方法のサブセットを用いる。従って、例えばルックーアップテーブル６２はサービスB(例えば、"再生")により引き起こされた方法とサービスAでネットワークインタフェースを横切って方法呼び出しを行うXML文書またはメッセージ間で変換を提供する。ソフトウェア手段Bにより用いられるXCE定義のサブセットはネットワークの使用拡張及び本質に依存する。例えば、前記サブセットは、ホームネットワーク上で全ての可能なサービスの包括的あるいは制限された使用を提供するために選択されることができる。

【００５８】

従って、前記API拡張はXMLを使用するネットワーク上で多様なデバイス間で通信を提供する。前記の例で、サービスBのためのプログラムコード２０はAPIで方法呼び出しを生成し、API呼び出しは内部ーデバイス通信のためのウェブ/インターネット標準XMLに適合にXML形態に変換される.XML方法呼び出し(メッセージ)はネットワークを通じてサービスAに伝送され、サービスAはネットワークインタフェースからのXML方法呼び出しをサービスAのためのプログラムコードAPI定義に再変換する。前記変換及び再変換は、他のデバイス間で２進互換性を異に要求す

るプログラムコードAPIを有するネットワーク内の多様なデバイスのためのウェブ/インターネット互換性を提供する。図１５でのブロック図を使用するXMLインタフェースブロックの実施形態が下に示される。

---

interface.dtd

rules for describing an object interface in xml

```
<!ELEMENT  parameter  #PCDATA>
<!ATTLIST  parameter  valueCDATA  #REQUIRED>
<!ELEMENT  method        (#PCDATA,(parameter)+)>
<!ELEMENT  object        (#PCDATA)
<!ELEMENT  call      (object,(method)+)>
```

---

interface.h

example object interface in c

```
/*object*/
typedef struct stream{
    int id;
};
/*method*/
void StreamPlay(int id,intspeed);
void StreamStop(int id);
```

---

interface.xml

the same object in xml using ruels of interface.dtd

```
<object>Stream
    <method>Play
```

```
                <parameter type="int">id</parameter>
                <parametert ype="int">speed</parameter>
        </method>
        <method>Stop
                <parameter type="int">id</parameter>
        </method>
</object>
```

---

call.dtd

rules for describing a c function call in xml

```
<!ELEMENT  parameter  #PCDATA>
<!ATTLIST  parameter  TypeCDATA  #REQUIRED>
<!ELEMENT  method          (#PCDATA,(parameter)+)>
<!ELEMENT  method          (#PCDATA,(method)+)>
```

---

controller.c

example controller command in c

```
.
.
.
StreamPlay(0x1ae,500);
.
.
.
```

---

call.xml

the same command in xml using call.dtd

```
<!-example to play a stream-->
    <call>
        <object>stream</object>
        <method>Play</method>
        <parameter value="500">speed</parameter>
    </call>
```

【００５９】

さらに、上記では、前述された利用可能なサービスの説明文書のINTERFACE.XMLの説明文書を作成するように使われたインタフェース定義INTERFACE.DTD及びCALL.DTDの例を示す。前記CALL.DTD定義は、XML.RPC(Remote Procedure Call)またはXML.RPCメッセージのような方法呼び出しまたは関数呼び出しメッセージを生成するための規定セットを含む。前記CALL.DTD定義は制御器サービス１４の出力インタフェースを説明する。ホームネットワークで、例えばINTERFACE.XMLはホームネットワーク上に利用可能なサービスを表現する。利用可能なサービスはCE領域で全体サービスのサブセットである。

【００６０】

OTR(One-Touch-Record)概要で、使用者は衛星STBのようなチューナーアクセスデバイスの制御を行う。使用者はプログラムリストを示すグラフィック的な使用者インタフェース表現のようなEPG(Electronic Program Guide)を使用してチューニングを制御する。OTR録画は、使用者が時間遅延された録画のためにVCRをプログラムするためにVCRグラフィック使用者インタフェースをアクセスせずに録画できるようにEPGから将来のプログラムの選択を含むサービスを提供する。OTRはVCRの制御を自動化する。下記はOPR.XMLの例示的な動作制御リストである：（１）StreamOpen＝衛星STBからネットワークに出力された選択されたプログラムストリームを再生;OTRのためにこの制御はSTBデバイスに局部的である;（２）StorageOpen＝貯蔵サービスオープン;及び（３）StorageRecord＝ネットワークを通じてVCRに録画命令伝送。

call.dtd

rules for describing a c function call in xml

```
<!ELEMENT  parameter  #PCDATA>
<!ATTLIST  parameter  valueCDATA  #REQUIRED>
<!ELEMENT  method          (#PCDATA,(parameter)+)>
<!ELEMENT  object          (#PCDATA)>
<!ELEMENT  call                (object,method)>
```

interface.dtd

example for describing an object interface in xml

```
<!ELEMENT  parameter  #PCDATA>
<!ATTLIST  parameter  valueCDATA  #REQUIRED>
<!ELEMENT  method          (#PCDATA,(parameter)+)>
<!ELEMENT  object          (#PCDATA,method+)>
```

interface.xml

this document describes various CE services offered-a subset of the whole CE space。

```
<?xml version="1.0"?>
<!DOCTYPE interface SYSTEM "interface.dtd">
<object>Stream
        <method>Open
                <parameter type="int">id</parameter>
                <parameter type="int">channel</parameter>
        </method>
        <method>Close
```

```
                    <parameter type="int">id</parameter>
            </method>
</object>
<object>Control
            <method>Set
                    <parameter type="int">id</parameter>
                    <parameter type="int">level</parameter>
            </method>
</object>
<object>Storage
            <method>Open
                    <parameter type="int">id</parameter>
                    <parameter type="int">channel</parameter>
            </method>
            <method>Record
                    <parameter type="int">id</parameter>
            </method>
            <method>Play
                    <parameter type="int">id</parameter>
                    <parameter type="int">speed</parameter>
            </method>
            <method>Stop
                    <parameter type="int">id</parameter>
            </method>
            <method>Close
                    <parameter type="int">id</parameter>
            </method>
</object>
<object>Display
```

```
        <method>Open
                <parameter type="int">id</parameter>
                <parameter type="int">channel</parameter>
        </method>
        <method>Render
                <parameter type="int">id</parameter>
        </method>
        <method>Blank
                <parameter type="int">id</parameter>
        </method>
        <method>Control
                <parameter type="int">id</parameter>
                <parameter type="int">cid</parameter>
                <parameter type="int">level</parameter>
        </method>
        <method>Close
                <parameter type="int">id</parameter>
        </method>
</object>
<!--------------------------------------------------------------------
    otr.xml
    an xml representation of one touch record
    c representation:
    StreamOpen(100,2);/*play a stream(pushed by satellite feed*/
    StorageOpen(24,2);/*open a storage service*/
    StorageRecord(24);/*record the stream*/
--------------------------------------------------------------------
    <?xml version="1.0"?>
    <!DOCTYPE interface SYSTEM"call.dtd">
```

```
<call>
    <object>stream</object>
        <method>open</method>
            <parameter value="100">id</parameter>
            <parameter value="2">channel</parameter>
</call>
<call>
    <object>storage</object>
        <method>open</method>
            <parameter value="100">id</parameter>
            <parameter value="2">channel</parameter>
</call>
<call>
    <object>storage</object>
        <method>Record</method>
            <parameter value="100">id</parameter>
</call>
```

【００６１】

図１５に関して上で議論されたように、第１デバイスBはAのデバイス性能とAPIインタフェースの細部事項を調べるために第２デバイスAのINTERFACE.XML文書をアクセスし、第２デバイスAの支持された機能及び命令項目を決定できる。特別に、前記第１デバイスBは第１デバイスBと第２デバイスAにより支援されたオーバーラッピング、そして従って利用できる方法を決定できる。図１６は、アプリケーションBを含む第１サーバデバイスBがアプリケーションAを含む第２サーバデバイスAのINTERFACE-A.XML文書をアクセスする例を示す。前記第１サーバデバイスBは、第２サーバデバイスAでINTERFACE-A.XML文書と比較するためのINTERFACE-B.XMLを含む。

【００６２】

一つのシナリオで、前記第１サーバデバイスBはネットワークで第２サーバデ

バイスAを制御しようとする。前記第２デバイスAのINTERFACE-A.XML文書は第２サーバデバイスAから第１サーバデバイスBに伝送され、第２サーバデバイスAの性能及びAPIインタフェース方法を質問するアプリケーションBにより使われる。これは第１サーバデバイスBがXML遠隔手順呼び出しXMLRPCを使用して第２サーバデバイスAを制御することを許容する。他のシナリオで、前記第１サーバデバイスBは少なくとも一回第２サーバデバイスAと通信を試みて通信確認が失敗した後、上記の段階を行う。また他のシナリオで、前記第１サーバデバイスBは第１サーバデバイスBにINTERFACE-A.XML文書を伝送せずに遠隔で第２サーバデバイスA内のINTERFACE-A.XMLに問い合わせる。

【００６３】

INTERFACE-A.XML文書の項目を調べることにおいて、前記第１サーバデバイスBは、前述されたようにXMLフォーマットで第２サーバデバイスAに伝送するための命令を創出できる。一般に前記第１サーバデバイスBは、前述されたように第１及び第２サーバデバイスB及びAにより使われたXCE定義サブセットでオーバーラップするINTERFACE-A.XMLの少なくとも一部項目を解釈できる。もし前記第１サーバデバイスBがINTERFACE-A.XML文書の一部項目を解釈できないならば、第１サーバデバイスBはその部分を無視したり、後述されるように翻訳によりその部分を説明するようにアシストするアプリケーションをフェッチできる。

【００６４】

図１７を参照すれば、制御器サーバデバイス１４及び制御されたサーバデバイス１４間のデバイス－デバイスまたは内部デバイスを制御する他の例が示される。前記制御器デバイス１４は制御器アプリケーションを含み、制御されたデバイス１４は実行可能なアプリケーションCを含む。制御されたデバイス１４はINTERFACE-A.XML、アプリケーションCのアプリケーションインタフェース説明をさらに含む。アプリケーションEは、制御されたデバイス１４の性能及び制御されたサーバデバイス１４のAPIインタフェース方法を問い合わせるために制御されたデバイス１４内のアプリケーションインタフェース説明Aをアクセスする。次に、アプリケーションEは、制御されたデバイス１４のハードウェアまたはサービスDを制御するためにXML遠隔手順呼び出しを使用してアプリケーションCを命令

し制御する。スケジューラデバイスはVCRの時間－遅延－録画制御器のように定められた日になれば駆動する制御器デバイス１４の一場合でありうる。

【００６５】

第１例で、前記アプリケーションEは、ネットワークを通じた遠隔照会によりアプリケーションインタフェース説明Aをアクセスする。第２例で、前記アプリケーションEは、制御されたデバイス１４から制御器デバイス１４にアプリケーションインタフェース説明Aのコピーを伝送することによってアプリケーションインタフェース説明Aをアクセスする。次に、アプリケーションEは局部的にインタフェース説明Aに問い合わせる。第３例で、アプリケーションインタフェース説明Aはインタフェース説明のためにライブラリ空間を提供するライブラリデバイス６４に伝送され、アプリケーションEはライブラリでインタフェース説明Aを遠隔で問い合わせる。前記ライブラリデバイス６４は直接的な制御動作及び応答を使用できる関連したアプリケーションのアドレス(URL)を貯蔵する。

【００６６】

図１８を参照すれば、XMLプロトコルはネットワークで多様なデバイス１４のアプリケーション２０間のAPIレベルで通信スタック６６においてウェブ標準共通ミドルウェア階層を提供する。各デバイス１４で通信スタックの最上部アプリケーションはネットワークを通じて通信メッセージを送受信し、デバイスのためのデバイスハードウェアまたはサービスソフトウェアを局部的に制御するデバイススタックでソフトウェア階層と通信する。

【００６７】

XML層OUT ６８でデザインされた第１XML層APIはメッセージを送信するために使われ、XML層IN ７０でデザインされた第２XML層APIはメッセージを受信するために使われる。XCE定義と方法呼び出しのXML定義、即ち前述された文書タイプ定義CALL.DTDは、XML層OUT ６８を生成するように使われる。さらにXCE定義及び方法呼び出しのためのXML定義、即ち前述された文書タイプ定義INTERFACE.DTDは、XML層IN ７０を生成するように使われる。例えば制御器アプリケーションはXML層OUT ６８を使用し、制御されたアプリケーションENXML層IN ７０を使用する。

【００６８】

図１９を参照すれば、サーバデバイス－サーバデバイス命令及び制御構造のさらに他の実施形態を示す。XML－基盤制御構造は、ウェブとインターネットにより駆動されるデバイスまたはサービスのためのデバイス－デバイス（サービス－対－サービス）のために使われる。第１デバイスAは、XML命令メッセージを使用するネットワークを通じて第２デバイスBでアプリケーション２０を遠隔で制御できる。各デバイスに対するインタフェースは前記デバイス内でアプリケーションに対するインタフェースを含みXMLフォーマットで述べられる。後述されるように、前記インタフェースはネットワークを通じて他のデバイスによる訂正及び説明のためにミドルウェア階層上で拡張され使用可能になりうる。

【００６９】

それぞれのサーバデバイスA及びBはネットワークを通じて他のサーバデバイスを制御し、ネットワークを通じて他のサーバデバイスにより制御されるためのハードウェアとソフトウェアを含む。図１９で、ホームネットワークデバイスAは制御器デバイスまたはモジュールであり、ホームネットワークデバイスBは制御されたデバイスまたはモジュールである。それぞれのデバイスA及びBは、インタフェース文書INTERFACE.XML及び文書タイプ定義INTERFACE.DTDで構成された局部的なデバイスXMLインタフェース７２を含む。INTERFACE.XML文書は対応するデバイス１４により支援される対象、方法及びパラメータの説明を含む。前記INTERFACE.DTD文書は、前述されたようにデバイスのXMLインタフェースで具体的な正当性チェックのために使われたりする。

【００７０】

それぞれのデバイスA及びBはまたXMLインタフェース及びXMLRPC命令のようなXMLメッセージをパーシングし確認するためのプログラムコードで構成されたXMLパーサ（Parser）７４を含む。前記XMLパーサ７４は図１８に関して前述された前記XML階層IN ７０と類似である。さらに、それぞれのデバイスA及びBは、XMLRPCの方法名とパラメータを再生するためにXMLRPCメッセージから送出する方法名とパラメータをエンコーディングするためのXMLRPCエンコーダ及び入力されるXMLRPCメッセージをデコーディングするためのXMLRPCデコーダを含む。XMLRPCコーデック７６はデバイスXMLインタフェース７２及びデバイス－デバイス制御構造か

ら独立され、それよりデバイスーデバイス制御構造の他の特徴を変化させずに他のXMLRPCフォーマットの使用を許容する。

【００７１】

プログラムコードで構成されたインタフェースフェッチャ(Fetcher)は、さらに他のデバイスまたはホームネットワークインタフェースライブラリ８０から直接的にさらに他のデバイスのデバイスインタフェースをフェッチするためにそれぞれのデバイスA及びBにより使われる。デバイス１４が制御器デバイスであれば、制御器デバイス１４内の制御器アプリケーションプログラムコード８２は、XMLパーサ７４、インタフェースフェッチャ７８及びXMLRPCコーデック７６のような制御器デバイス１４内のソフトウェア及びハードウェアを統制することによって、ネットワークを通じて他のデバイス１４の命令及び制御に影響を与える。デバイス１４が制御されたデバイスであれば、制御されたデバイス１４内の制御されたアプリケーションプログラムコード８４は他のデバイス１４により制御されるデバイス１４のためにデバイス１４内のソフトウェア及びハードウェアを統制する。それぞれのデバイスA及びB内のホームネットワークデバイスウェブサーバ８６はネットワーク上のデバイス間の通信を管理する。各デバイスA及びB内の固有ルックアップテーブル８８に対するXMLはX、MLRPCメッセージ(例えば方法名称、構成要素名称及びタイプ)をデバイスの固有インタフェース(例えば固有方法名称、構成要素及びタイプ)に変換する制御されたアプリケーション８４により使われる。前記テーブル８８は、XMLメッセージ内で方法及びパラメータの名称とデバイスの固有インタフェースが同じ場合には使われない。

【００７２】

それぞれのデバイスA及びBは一つ以上のハンドラ(Handler)９０をさらに含み、各ハンドラ９０は制御されたアプリケーション８４内部から特定デバイス機能の固有具現へのポインタを含む。大部分のデバイスでデバイス機能の固有具現は実行時間での２進コードを含む。２進コードは例えばC及びジャワを含んで、コンパイル時間に高水準の言語から生成される。従って、電化製品製造者は存在するハンドラ及び機能具現に影響を及ぼさずに新たな機能のためのより優れたハンドラ９０を追加できる。それぞれのデバイスA及びBでハードウェアサービス９２

はデバイス機能の固有具現を含む。それぞれのデバイスA及びBはまたデバイス機能の固有具現でAPIを具備する固有インタフェース９４を含む。

【００７３】

さらに、ホームネットワーク対象要請ブローカ(HNORB: Home Network Object Request Broker)７９及びインタフェースライブラリ(IL: Interface Library)のようなネットワーク対象要請ブローカはホームネットワーク１０のためのミドルウェア階層９８を提供する。図１９に示したように、前記ミドルウェア階層９８は第３デバイス９６または分離された制御ハブに位置できる。前記HNORB７９は、ネットワーク１０に接続された他のデバイス１４の存在を見つける一つのデバイス１４により使われるためのソフトウェアエージェントを含む。前記HNORBソフトウェアエージェントはデバイス名称を名称の階層的なツリー構造で組織し、デバイスインタフェースを前記検索できるインタフェースライブラリで組織し、そしてインタフェース情報を要請するデバイスにデバイスインタフェースを提供する。

【００７４】

HNORB７９及びIL８０で構成されたミドルウェア階層は、指定された局部的なホームネットワーク１０の外部からアクセスされる選択されたホームデバイスのようにインターネットに直接連結される。一つの局部的なホームネットワーク内のミドルウェア階層９８は、二つのホームネットワーク１０を備える統合されたネットワークを提供するためにインターネットを通じて他の局部的なホームネットワークでミドルウェア階層９８に接続される。このような場合に、適当なストリーム符号化を有する認証された使用者はビデオを再生しTVでそれを見るために使用者の第２家庭内のTVから使用者の第１家庭内のDVDチェンジャ(Changer)をアクセスできる。

【００７５】

前記インタフェースライブラリ８０を使用するために、少なくとも一つのHNORB&ILは局部的なホームネットワーク１０上で動作中であるべきである。一つ以上のHNORB&ILがまた利用される。例えば、ケーブルモデム、いくつかのDTV、そして中央家庭ハブは全てそれら自体のHNORB&ILソフトウェアエージェントを有する

ことができる。HNORB&ILの位置を定めるためにデバイス１４は局部的なホームネットワークを通じて放送メッセージを伝送する。デバイス１４で応答した第１HNORB&ILはデバイス１４により使われる。一応HNORB&ILが位置すれば、デバイス１４及びHNORB&ILは登録、インタフェース要請及びフェッチのための地点間TCP(Transmission Control Protocol)またはUDP(User Datagram Protocol)とデバイスルックアップサービスを確認できる。もしUDPプロトコルを利用できなければ、TCPプロトコルがIEEE１３９４のような高帯域幅接続のために使われる。HTTP一基盤のXMLRPCはHNORB&IL通信のためのデバイスのために使われる。例えば、デバイス１４は一つ以上の構成要素としてデバイスインタフェースをパスするためにHNORBの"レジスター"方法を遠隔で呼び出すことができ、またはXMLRPC呼び出しはXMLRPC応答または戻る値としてILから部分的または全体的なデバイスインタフェースを再生できる。

【００７６】

前述したように、一つ以上のHNORB&ILは同時に局部的なホームネットワーク１０で動作でき、ここで各HNORB&ILは使用可能なデバイスのサブセットを認識でき、一つのHNORB&ILは見つけられないデバイス１４を位置させるために他のHNORB&ILと通信できる。一つの局部的なホームネットワーク１０上の多重HNORB&ILは、UDP及びTCPのような放送メッセージを使用することによって自動で相互間に位置できる。このような場合に、多重HNORB&ILは多数のインタフェースライブラリ８０が分散インタフェースライブラリを構成する間分散対象要請ブローカを構成する。故障許容誤差を提供するために、もし一つのHNORB&ILが突然終らなければならないならば、このHNORB&ILと共に登録された全てのデバイスは通知され、前記デバイスは他の有用なHNORB&ILと共に自動で登録される。

【００７７】

各デバイスインタフェースは組合された一貫的で単一の論理的な名称を有している。他のデバイスは、前記デバイスの位置または実際ネットワークアドレスが変わった後にもデバイスを認識しアクセスする前記一貫的で単一の論理的な名称を使用できる。論理的な名称のマッピングと実際デバイスアドレスのマッピングはHNORBで命名サービスのためのソフトウェアエージェントにより扱われる。望

ましくは、標準化された命名方法が使われる。より望ましくは、デバイス名称を階層的ツリー構造で操作するために階層的な命名構造が使われる。この階層的な構造はファイルシステムと類似に"/"を使用して表現できる。その構造は、家庭/MPEG２/TVのような他のサービスタイプにより、または家庭/居間/VCRのような他の位置によるもののように、他の方法で生成される。いろいろな命名ツリーは実行と能率のために共存できる。

【００７８】

図１９での制御器サーバデバイスA及び制御器サーバデバイスB間の命令及び制御例で、前記ミドルウェア階層９８は第３デバイス９６にあったり、または分離された中心ハブにありうる。暗いブロックは、図１９に示した特殊な命令及び制御プロセッサのために使われたデバイス構成要素を示す。動作シナリオで、デバイスA及びBがネットワークを通じて使用可能になりアクセス可能になった後、各デバイスは中央HNORB及びILミドルウェア層９８にそれ自体及びそれのXMLインタフェースを書き込み/提出する。もし中央HNORB及びILミドルウェア階層が使用できなければ、各デバイスはそれ自体を知らせるために局部的なホームネットワークを通じてメッセージを放送する。

【００７９】

前記デバイスAの制御器アプリケーション８２は制御されたデバイスBの全体または部分のデバイスインタフェースに問い合わせを試みる。もしインタフェースライブラリ８０が有用でなければ、制御器デバイスAはネットワークを通じてデバイスBに要請を最初に伝送し、それからデバイスBからデバイスBのXMLインタフェースを受信することによって、制御器デバイスBから直接的に制御されたデバイスBのデバイスインタフェースを求めフェッチできる。しかし、もしインタフェースライブラリ８０が使用できれば、制御器デバイスAはインタフェースライブラリ８０から制御されたデバイスBの全体または部分のデバイスインタフェースを求められる。HNORBのソフトウェアエージェントはインタフェースライブラリ８０から前記デバイスBのXMLデバイスインタフェースを得、制御器デバイスAにそれを回送する。

【００８０】

一応制御器デバイスAが制御されたデバイスBのXMLデバイスインタフェースを受信すれば、デバイスAの制御器アプリケーションはデバイスBのデバイスインタフェースを分析し翻訳するためにデバイスAのXMLパーサ７４を使用する。それからデバイスAのXMLRPCコーデック７６はパーシング結果を使用して望ましいXMLRPC命令メッセージを生成する。前記XMLRPC命令メッセージはネットワークを通じて制御されたデバイスBに伝送される。前記XMLRPC命令メッセージを受信すれば、デバイスBの制御されたアプリケーション８４は受信されたXML命令メッセージを分析し翻訳するためにデバイスBのXMLパーサ７４を用いる。それからデバイスBのXMLRPCコーデック７６は、求められたサービスを行うためにデバイスB機能のための方法名称及びパラメータを含む命令メッセージから方法呼び出し情報を得るためにパーシング結果をデコーディングする。

【００８１】

デバイスBの制御されたアプリケーション８４は、次にデバイスBの固有インタフェースを通じてデバイスBの固有機能実行をアクセスし送出するためにデバイスBで固有ルックアップテーブル８８及びハンドラ９０に対してXMLを使用する。もし関数がある応答または戻る値を生成すれば、前記応答または戻る値はXMLまたはXMLRPCメッセージにエンコーディングされ、制御器デバイスAに伝送される。さらに、ミドルウェア階層HNORB及びILは制御されたデバイスBに対する参照を制御されたデバイスAに提供し、ここでデバイスAは局部的なデバイスA固有機能に対する呼び出しと同じようにデバイスB固有機能に対する遠隔呼び出しを発生させる。

【００８２】

望ましくは、全てのデバイスがネットワークを通じてRPC呼び出しを説明しデコーディングできるように、標準XMLRPCフォーマットが使われる。制御されたデバイス１４のデバイスインタフェースが制御器デバイス１４により問い合わせられ調査されるために、望ましくは能率を向上させるために充分なデバイスインタフェース情報を有する単純化されたXMLRPCフォーマットが使われる。次の例はOTR(One Touch Record)及びTDR(Time Delayed Record)動作のためにXMLRPCを呼び出す二つの可能なフォーマットを示す。

【００８３】

例Ｉ：

XMLRPC呼び出し、詳細タグ及びインタフェース情報を含むフォーマット例：

１．OTR呼び出し例：

```
<?xml version="1.0"?>
<call>
    <object>DVCR1.record</object>
    <method>timeDelayedRecord</method>
    <parameter>
<parameter>
        <name>channel</name>
        <value><int>4</int></value>
</parameter>
    <parameter>
        <name>recordTime</name>
        <value><time>2:10:30</time></value>
</parameter>
    </parameters>
</call>
```

２．TDR呼び出し例：

```
<?xmlversion="1.0"?>
<call>
    <object>DVCR1.record</object>
    <method>timeDelayedRecord</method>
<parameter>
    <name>channel</name>
    <value><channelName>NBC</channelName></value>
</parameter>
<parameter>
```

```
        <name>startTime</name>
        <value><datetime.iso8601>19990401T19:05:35<
        /datetime.iso8601></value>
    </parameter>
    <parameter>
        <name>recordTime</name>
        <value><time>2:00:00</time></value>
    </parameter>
        </parameters>
    </call>
```

【００８４】

例II:

XMLRPC呼び出し、減ったタグ及びインタフェース情報を有するフォーマット例：

１．OTR呼び出し例:

```
<?xml version="1.0"?>
<call>
    <object>DVCR1.record</object>
    <method>timeDelayedRecord</method>
        <parameter value="4">channel</parameter>
        <parameter value="2:10:30">recordTime</parameter>
</call>
```

２．TDR呼び出し例:

```
<?xml version="1.0"?>
<call>
    <object>DVCR1.record</object>
    <method>oneTouchRecord</method>
        <parameter value="NBC">channel</parameter>
        <prameter
```

value＝"1990401T19:05:35"＞startTime＜/parameter＞

＜parameter value＝"2:00:00"＞recordTime＜/parameter＞

＜/call＞

【００８５】

図２０を参照すれば、ホームデバイス１４のためのデバイスインタフェースは、標準化された用語を使用する産業標準構造化されたデータベース１００に基づく。新たなインタフェースのためのインタフェースデータ及び用語はデータベース１００に追加される。CE対象を説明するために英単語を使用する包括的な定義あるいはデータベース、方法そしてパラメータはCEデータベース１０２に規定される。包括的な定義またはデータベースは対象及びそれらそれぞれの方法及び構成要素を示すC、XMLまたは他のフォーマットになりうる。標準化されたXML用語を使用する包括的な定義またはデータベースはXCE定義またはデータベース１０４と呼ばれる。

【００８６】

制御器及び制御されたアプリケーション８２、８４は、XCEデータベース１０４に基づいたXMLの標準インタフェースサブセットを使用してプログラムされる。各デバイスインタフェースはXML形態で前記アプリケーション８２、８４と共に貯蔵される。たとえ前記XCEデータベース１０４がXMLにある必要がないとしても、図１５に関して前述されたように、本発明の実施形態でコンパイル時に作成された前記サブセットインタフェースはXML内にある。

【００８７】

図２０で、埋め込まれた装置１４のために'製造会社'情報としてデザインされた情報は製造時装置１４に内蔵されたものであり、'ホームネットワーク'としてデザインされた情報はネットワークで装置の動作的実行時間特徴の一部である。Nデバイスのための１....Nとしてデザインされたデバイス XMLインタフェース７２は、標準化されたXCEデータベース１０４でデータの一部分である。ホームネットワークインタフェースライブラリ(HNIL: Home Network Interface Library)１０６はホームネットワークに接続された使用可能なデバイス１４のデバイスインタフェース集合を提供する。HNIL １０６は全体XCEデータベース１０４のサブ

セットである。

【００８８】

図１６で、デバイスインタフェースはデバイスAのためのインタフェースの内容を調べるデバイスB内のアプリケーションBのためにデバイスAからデバイスBに伝送される。前述されたように、デバイスインタフェースはデバイスにより維持される対象、方法パラメータの説明を含み、例えばデバイスAに対するINTERFACE-A.XMLとして言及される。デバイスXMLインタフェース７２はXMLフォーマットのデバイスインタフェースである。XCEデータベース１０４の内容はデバイスインタフェースを提供するサービス基盤の構造である。

【００８９】

図２０を参照すれば、前記XCEデータベース１０４は、またCEデバイス１４を表現するXMLを使用するために標準化された規定セットを提供するCEデバイスのための標準化されたXCEインタフェース文書タイプ定義(DTD: Document Type Definition)を提供する。前記DTDまたはそのサブセットは正当性チェックのために使われる。製造会社手段１０８としてデザインされたソフトウェアエージェントは、規定されたCEデバイスのための標準化されたXCE定義のサブセットをフィルタリングして使用するが、例えばINTERFACE.XML及びINTERFACE.DTDのようなCEデバイスのXMLデバイスインタフェース７２を生成する標準化されたXCEインタフェースDTDを使用する。前記文書INTERFACE.XMLは標準化されたXCEインタフェースDTDに従って特殊なデバイスにより支援される対象、方法及びパラメータの説明を含む。前記文書INTERFACE.DTDは標準化されたXCEインタフェースDTDのサブセットであって、デバイスのXMLインタフェースのための正当性チェックのために使われる。他の文書タイプ定義もINTERFACE.XML文書を生成するために使われたりする。

【００９０】

前記XMLインタフェース文書及び前記DTD文書を含むCEデバイスのXMLインタフェース７２は、ホームネットワークインタフェースライブラリ１０６のような一般的にアクセスできるライブラリに貯蔵される。ソフトウェアエージェント１１０はネットワーク上の全てのアクセスできるデバイス１４のデバイスインタフェ

ース７２を収集し、デバイス名称/アドレス情報と共に検索できる構造化されたインタフェースライブラリ１０６にそれらを配置する。前記インタフェースライブラリ１０６はXCEデータベース１０４のサブセットであって、インタフェースライブラリ１０６を作る過程は部分または全てのXCEデータベース１０４を再構成することと類似である。前記インタフェースライブラリ１０６は、ホームネットワーク内の全てのデバイスのデバイスインタフェースの集合または最も最近に使われたデバイスインタフェース７２が貯蔵されるホームネットワークで全てのデバイス１４の有用性に依存するキャッシュ(Cache)として機能できる。デバイス１４が、DVD再生器でディスクを変えることのようなイベントに起因してそのデバイスインタフェース７２を更新した場合には、デバイスインタフェース７２の一部がイベントサービスに基づいて更新される。

【００９１】

図２１を参照すれば、望ましくは各デバイス１４のデバイスインタフェース定義７２は階層的な形態を有する。なぜならこれはホームデバイスにおいて、デバイスインタフェース定義７２が長くなる可能性があるからである。典型的に、時間遅延された録画のための単一機能のような一つまたは少数の機能は同時にアクセスされ、従って前記デバイスインタフェース７２の唯一に小さな部分が使われる。全体デバイスインタフェース７２を作成することよりはデバイスインタフェース７２の一部分だけを作成することがより効果的である。階層的なデバイスXMLインタフェースを使用することによって、制御器デバイス１４は、制御器デバイス１４またはHNORB及びILミドルウェア階層９８からXMLデバイスインタフェースのための要求において望ましい機能カテゴリーまたは機能を特定することによって、制御されたデバイス１４の部分的なデバイスインタフェース７２を求められる。後者の場合に、HNORB及びILミドルウェア階層９８はデバイスインタフェース７２の望ましい部分を回送する。

【００９２】

図２１を参照すれば、前記階層的なデバイスインタフェース構造は、（１）現在有用なデバイスを書き込んだ各ホームネットワークのXMLインタフェースのための第１階層１１２、（２）機能カテゴリーを書き込んだ各デバイスの一般的なX

MLインタフェースのための第２階層１１４、（３）デバイスのための各機能カテゴリーのXMLインタフェースを規定するための第３階層１１６、（４）機能カテゴリー内の各機能のXMLインタフェースを規格化するための第４階層１１８を含む４個の層を含む。ホームネットワーク内部で、ただ三つの下位層１１４、１１６及び１１８が使われ、ホームネットワーク外部で第１層１１２が使われる。

【００９３】

図２２は、前記層１１２、１１４、１１６、１１８及び対応するインタフェース例を示す。各階層内のインタフェースは(できれば)両方向リンクを提供するXリンクまたはXポインタのようなリンクを通じて上位または下位層にリンクされる。Xリンクは(１) XML文書内のリンクをリンクとして認識させるXリンク成分、(２) リンクをXML文書の正確なサブパートにアドレッシングさせるXポインタ成分の二つのパートを有するハイパーリンキング機能性のパッケージを含む。従って、Xリンクはどのようにリンクが XML文書に挿入されるかを管理するが、ここで前記リンクはGIFファイルのようなデータを示す。さらにXポインタは、どこからでも(例えばHTMLファイルから)、XML文書にリンクする時URLに行ける断片識別子(Fragment Identifier)を決定する。

【００９４】

本発明に係る他のサーバデバイス１４を制御するサーバデバイス１４のための典型的な命令及び制御モデルで、第１デバイス１４は第２インタフェース階層１１４で第２デバイス１４のデバイスインタフェースを問い合わせるように試みる。機能カテゴリー(FC: Function Category)を選択した後、前記第１デバイス１４は、録画カテゴリーのような第２デバイス１４で特定の機能カテゴリーのインタフェース階層１１６を問い合わせる。さらに、前記第１デバイス１４は前記機能に対する呼び出しを作るためにOTRまたはTDRのように特定の機能をインタフェース階層１１８に問い合わせる。階層的またはツリー構造はより効果的なインタフェース機能を探すようにしてネットワーク帯域幅を縮める。インタフェースファイル構造及び層の例が下記の通りである。

第１層１１２－HN1.xmlXML

第２層１１４－VCR1.xml

第３層１１６－VCR1_RecordCategory.xml

第４層１１８－VCR1_RecordCategory_OTR.xml

【００９５】

類似に、ホームネットワークインタフェースライブラリ１０６は階層的であり、デバイスの他のサービスタイプまたはルームのような他の位置により多様な方法で構造化できる。前記階層的な構造は他のホームネットワークまたはインターネットに対する局部的なホームネットワーク１０のインタフェースである。

【００９６】

XMLシンタックス(Syntax)で具現される例示的で階層的なデバイスインタフェース定義７２が下に示される。

```
consumer(document_file,doc)
    +----document_file<server_home.dtd,server_auto.dtd>
    +----doc(services_home,server_auto,server_samsung_web_site,
avc_commands,cal_commands,,)
      +----services_home(xml_utility,client,server_av,lighting,comms,
hvac,utility,security,appliances,convenience,,)
      +----xml_utility(download_DTD_file,,)
      +----client(acknowledge,attention,error,post_message,sound,
stop_schedule,stop_all,,)
          +----sound(alarm,ring,buzz,,)
      +----server_av(controls_gen,source,sink)
          +----controls_gen(ping,process_infor,setup,,)
            +----process_info(s/w_id,h/w_id)
                +----h/w_id(ser_no,manuf,model,class,,)
                +----s/w_id(ser_no,exe_name,version,,)
            +----setup(clock,,)
                +----clock(hours,minutes,seconds)
        +----source(service_id,media,rate,protocol,stream_format,
controls_av,,)
```

```
        +----sink(service_id, media, rate, protocol, stream_format,
controls_av,,)
            +----service_id(url,,)
            +----media(tpt_stream, ram, disk, tape,,)
              +----disk(name, number,,)
            +----rate<value>
            +----protocol(61883/1394, UDP/IP/Ethernet,,)
              +----61883/1394(isoch_ch_no)
            +----stream_format(video、audio,,)
              +----video(dv, mpeg2tpt, dsstpt, mpeg2pes, mpeg10801-tpt,)
              +----audio(mpeg3, ac-3, midi,,)
            +controls_av(flow_control, tune, timer_record, ui_control,,)
               +----timer_record(tune, flow_control)
                 +----flow control(play, stop, goto, record,,)
                    +----play(time_params)
                    +----record(time_params)
                      +----time_params(now, start, duration, end,,)
               +----tune(send_epg, channel,,)
                 +----channel(number, id, time_params,,)
                 +----ui_control(display, acoustic)
                 +----display(brightness, contrast, color/tint,
horiz_size, vert_size,,)
                 +----acoustic(volumn, base, treble, balance, fade,)
      +----lighting(sensors, lights, send_epg)
        +----sensors(living_room, sky,,)
        +----lights(rooms_up, rooms_down, yard,,)
           +----rooms_up(bed1, bed2, bed3, bed4,,)
             +----bed1(lamp, dimmer,,)
                +----dimmer<value>
```

```
            +----rooms_down(family, kitchen, living, dining, soho, garage, , )
            +-----yard(front, back)
        +----comms(homehub, intercom, telco, )
        +----homehub(send_device_list, send_configuration, sene_snmp_mib, , )
        +----intercom()
        +----telco()
    +----hvac(controls_gen, controls_havc, , )
        +----controls_hvac(a/c, heat, temp, humidity, )
          +----temp(low, high, hysteresis, , )
    +----utility(meters, energy_mgmt, , )
        +----meters(water, gas, electric, , )
          +----water＜value＞, gas＜value＞, electric＜value＞
    +----security(sensors, send_epg, alarm, , )
        +----sensors(peripheral, motion, , )
          +----peripheral(rooms_up, rooms_down, , )
          +----motion(room_down, yard, , )
    +----appliances(microwave, range, oven, fridge, freezer, coffee, toaster,
washer, dryer, water_heater, , )
        +----microwave(send_epg, controls, , )
        +----fridge(temp, )
        +----water_heater(temp, )
    +----convenience(window, curtain_open, door/gate, pool/spa, bath,
fountain, lift, jacuzzi, , )
        +----curtain_open＜value＞
    +----server_auto(message, server_auto_ford_explorer_98, , )
        +----server_auto_ford_explorer_98(mileage, maintenance, , )
    +----mileage＜data＞
    +----maintenance＜data＞
  +----server_samsung_web_site(message, service, help, , , )
```

＋----avc_commands＜,,,command_string,,,＞

＋----service_id(url,,)

＋cal_commands＜,,,command_string,,,＞

＋----service_id(url,,)

【００９７】

前記階層的なデバイスインタフェース定義７２は次のような分野を含む。

'document file'、これはXCEデータベース１０４またはXCEデータベース１０４のバージョン部分の正当性及び訂正の検証のためにXMLパーサにより使われる文書タイプの規定(DTD)ファイルの名称を提供する。前記XCE構造の相異なる部分のためのいろいろなDTDファイルが考えられ、ここで前記DTDはRPC.CALLのための文書タイプ定義及び通信のためのINTERFACE.DTDとは違う。

'doc'、これは互換性、特性、通信及び制御インタフェースの領域の最上位レベル名称を提供する。

'Services_home'、これは家庭自動化、電化製品、効用性のための領域を提供する。

'Server_auto'、これは車庫内にある自動車に対して、一台またはそれ以上の自動車タイプに対する有用なメッセージインタフェースを示す。例えば、'server_auto_ford_explorer_98'は特定自動車に対するインタフェースである。これは自動車のマイレージ及び保守インタフェースをアクセスできるようにし、直接チェックする自動車製造会社または車庫が直接チェックまたは遠隔診断する遠隔アクセスで使われる。

'server_samsung_web_site'、これは家庭外部の製造会社ウェブサイトと通信し、メッセージ、サービス、アシストなどのためのインタフェースを含む。

'AVC_commands'及び'CAL_commands'、これは例えばAV/C及びCAL言語を解釈できる引き継ぐんだデバイスを提供する。この構造部分は前記言語で命令を確認し、命令はXMLで付加されたり行われる。従って、前記項目はXCE(Web)対象ではなく、プロトコル変換器アプリケーションは元のCALまたはAV/Cアプリケーションソフトウェアへのインタフェースとして使われる。

【００９８】

前述したように、'Services_home'はA/V電化製品を含むメーン構造を提供する。前記構造の一部分は特定な例としてビデオサービスシンク及びストリーム目的地(例えば、DVCR)制御インタフェースに対し詳細に拡張される。典型的なホームネットワークで制御インタフェースは次を含む：

'xml_utility'、これは更新されたDTDファイル、インタフェースファイル、プログラムファイルをダウンローディングすることのように支援ユーティリティネットワーク機能を支援するための細部事項を提供する。

'client'、これはウェブブラウザを含むクライアントデバイス１２のインタフェース細部事項を説明する。例えば、'acknowledgment'は発送されたメッセージまたは命令で制御器の認証承知を表示する。

'server_av'、これはSTB、DVCR、DTV、DVD、AUDIOなどを含む有用な全てのオーディオ及びビデオサービスに対して制御及び容量インタフェースを提供する。

'lighting'、これは家庭自動化照明制御器にインタフェースを提供し、センサー及び照明などを含む。

'comms'、これは典型的に使用目的またはデバイスのセットーアップまたは構成要素の遠隔管理または構成を復旧するために通信デバイスに制御インタフェースを提供する。

'hvac'、これはHVACシステムの遠隔制御のためのインタフェースを提供し、例えばその日のピーク負荷期間中に家庭のHVACシステムを消すために公益設備会社(Utility company)により家庭外部から前記システムを制御するために使われる。さらに、前記インタフェースは、自動温度調節装置制御よりさらに複雑な制御メカニズムを提供する制御器に基づいたデバイスのための装置により、家庭内部からHVACシステムを制御するために使われる場合もある。

'utility'、これは例えば、家庭のための計量器を読取るためのインタフェースを提供する。

'security'、これは保安センサー及びアラームセッティングのためのインタフェースを提供する。従って、ホームネットワークデバイス上でインタフェース使用、アプリケーション進行はそのデバイスの監視及び制御のための家庭周辺のセンサー及び感知器をアクセスできる。

'appliances'、これは例えば、遠隔制御または温度設定感知または制御器デバイスから他の制御及び構成要素を含む台所、有用で一般の家庭装置のためのインタフェースを提供する。一シナリオで、電子レンジは料理アイテムパッケージ上のバーコード情報をスキャンでき、与えられた電子レンジシステムタイプに対して料理の調理時間を知るために製造業者データベースをアクセスできる。デバイスーデバイス命令及び制御を使用する装置の統合は、台所または居間で電話を受けた時自動で食器洗い器を止めテレビをミュート(Muting)させることのようなサービスを提供するために多くの制御シナリオを提供する。

'convenience'、これは例えばカーテン、窓、ブラインドまたは洗濯制御器に対するインタフェースのように便宜サービスを提供するために装置に対するインタフェースを提供する。

【００９９】

前記の説明で、'server_av'はA/Vサービスを提供するA/V装置に対して制御インタフェースのための構造の一部分であって、'controls-gen'、'source'、'sink'性能にまた分けられる。

'controls-gen'は、デバイス製造者属性及びデバイス存在をテストするピング(Ping)テストのような一般のユーティリティインターフェーシングのためのインタフェースを提供する。さらに、ソフトウェア及びハードウェア確認及びバージョン情報のような製造特性が含まれる。前記インタフェースを提供するデバイスはどんな制御動作ももたらさずに前記ソフトウェアに対する名称または確認を提供するデータを返す。またデイクロックの時間をセットするインタフェースが含まれる。

'sink'は、メディアストリームサービスデバイスのためのインタフェースを提供する。その構造はVCRのような特別のデバイス名称というよりは提供されたサービス(例えば、ビデオストリーム録画及び再生)に基づいた構成である。例えば、チューナとDVDプレーヤーは二つともネットワークに対してビデオプログラムフォーマットを有するビデオプログラムストリームソースであって、開始及び停止のように制御される。特定のデバイス制御での差異点は構造化定義の下部階層によりアドレスされる。

'source'は'sink'インタフェースと類似のインタフェースを提供する。

【０１００】

前述した内容を参照すれば、'service_id'または'application_interface_id'は名称、アドレスまたはウェブアドレス、または一つ以上のデバイスのURL位置を含む。XCEデータベース１０４はインタフェースに対して合意された全体を構成するために、通常DHCP(Dynamic Host Configuration Protocol)ソフトウェアエージェントは各デバイスにアドレス及びデフォルト名称を割り当て、前記アドレス及びデフォルト名称はサービスまたはデバイスのインタフェースに追加される。それから、ソフトウェアエージェント１１０は'部分的なXCEネットワーク(Network partial XCE)'を生成するために、ホームネットワークに局部的に接続された全てのデバイスからサブセットまたは'部分的なXCEデバイス(Device partial XCE)'を含むデバイスインタフェース７２を集める。付加的な関連外部インタフェースが外部制御のための構造に追加される。例えば、'service_id'は、ネットワークに接続されたデバイスのデバイスインタフェースによってソフトウェアエージェントから加入を含む受信された構造またはネットワークインタフェースライブラリ１０６内の名称/アドレスでありうる。その後、使用者はデータベースでサービスを検索でき、前記名称/アドレスを使用してライブラリの特定のデータ部分を含むアプリケーションをアクセスできる。従って、ネットワークは前記名称/アドレス情報により識別された多重の同じサービスを含むことができる。

'media'、これは例えば、チューナからの伝送ストリーム、PC DRAMからRAM、DCまたはDVDのためのディスク及びテープを含むメディアタイプのためのインタフェースを提供する。前記メディアは命名され確認され、制御器デバイスはネットワーク上で提供される一般のメディアを確認するXCEデータベースを検索できる。DVDディスクのような新たなメディアがネットワーク上で提供される時、ディスク上でプログラム資料を確認するデバイスインタフェース７２の一部が適合に変換される。従って、全体デバイスインタフェース７２が伝送される必要はなく、ただ適した部分がXCEデータベースに伝送される。アテンション信号の受信でライブラリソフトウェアエージェント１１０は新たな更新をフェッチでき、適し

た場所にそれを位置させられる。ディスクメディアの付加は、前記ネットワークにサービスを追加したりまたは前記ネットワークに他の装置を接続することと類似である。

'rate'、これは例えば、６Mbits/Secまたは１９．２Mbits/Secのようにデバイスインタフェースのためのデータストリームレートに対する値を提供する。

'protocol'、これは前記データストリームのために使われたプロトコルを確認する。例えば、６１８８３/１３９４またはUdp/IPのように、一つ以上のプロトコルが提供されれば、望ましいプロトコルが選択される。

'stream_format'、これはデジタルストリームオーディオ及びビデオ分割のためのパケットフォーマット及び/または圧縮標準を提供する。もし一つ以上のフォーマットが提供されれば、望ましいフォーマットがインタフェースメッセージを通じて選択される。制御器アプリケーション８２は互換的なフォーマットがあるかどうかを決定できるフォーマットを調べられる。

'controls_av'、これはA/Vメディア装置のためのメーン制御インタフェースを提供する。

'Flow_control'、これは特定のデバイスのための方法であってPLAY、STOP、GOTO、RECORDのようなデータストリーム制御を提供する。その方法は、例えばPCソフトウェアを除いては埋め込まれた(Embedded)装置に対して変わらない。tkdrl制御は遅延された動作のために時間構成要素を含むことができる。

'Tuning'、これはチューニング制御のためのインタフェースを提供する。制御器デバイス１４は、制御されたデバイス１４のインタフェースに前述された電子プログラムガイド(EPG: Electronic Program Guide)データ構造の返信を求められる。

'UIcontrol'、これはディスプレイに対する輝度及びコントラスト、オーディオに対するボリューム及びベースのような修正を制御するために制御されたアプリケーション８４に制御インタフェースを提供する。

'Timer_record'、これは遅延された時間記録を具現するために制御器アプリケーション８２に対してセットーアップデータのためのインタフェースを提供する。直接的なチャンネル同調情報及びフロー制御(time_aparams)情報が使われたり

する。

【０１０１】

前記の説明はクライアントデバイス１２に同一に適用できる。CE領域のための他のシンタックスXCE定義またはデータベースが使われたりする。代案的なシンタックスXCEデータベースは、例えば家庭自動化、装置及び自動車を含む全てのサービス説明を含む。サービス対象が制御のために適応性及びパラメータを提供する場合、制御方法は希望の通りに前記対象を制御するために使われる。２進数または１６進数データ列を含むAV/C及びCAL命令語で命令例が下に示される。

```
consumer(document_file,doc)
    +---document_file<server_home.dtd,server_auto.dtd>
    +---doc(avec_commands,cal_commands,services_home,server_auto,)
server_auto,
server_samsung_web_site,server_auto_ford_explorer_98,,)
        +---avc_commands<...command_string...>
        +---call_commands<...command_string...>
        +---services_home(client,av,lighting,comms,hvac,utility,
security,appliance,convenience,,)
              +---xml_utility(download_DTD_files,,)
              +---client(acknowledge,attention,error,post_schedule,
soundstop_schedule,stop_all,,)
                   +---sound(alarm,ring,buzz,,)
              +---server_av(source,sink)
                   +---soruce(service_id,media,rate,protocol,
stream_format,controls_gen,controls_av,,)
                   +---sink(service_id,media,rate,protocol,
stream_format,controls,,)
                        +---service_id(url,,)
                        +---media(tpt_stream,ram,disk,tape,,)
                             +---disk(name,number,,)
```

```
                    +----rate<value>
                    +----protocol(61883/1394,UDP/IP/Ethernet,,)
                        +----61883/1394(isoch_ch_no)
                    +----stream_format(video,audio,,)
                        +----video(dv,mpeg2tpt,dsstpt,mpeg2pes,
mepeg1080i-tpt,)
                        +----audio(mpeg3,ac-3,midi,,)
                    +----control_gen(ping,process_info,setup,,)
                    +----controls_av(flow_control,tune,timer_record,
ui_control,,)
                        +----process_info(s/w_id,h/w_id)
                            +----h/w_id(ser_no,manuf,model,class,,)
                            +----s/w_id(ser_no,exe_name,version,,)
                        +----setup(clock,,)
                            +----clock(hours,minutes,seconds)
                        +----time_record(tune,flow_control)
                        +----flow_control(play,stop,goto,record,,)
                            +----play(time_params)
                            +----record(time_params)
                        +----tune(send_epg,channel,,)
                                +----channel(number,id,
time_params,,)
                                        +----time_params(now,start,
duration,end,,)
                        +----ui_control(display,acoustic)
                            +----display(brightness,contrast,
color/tint,horiz_size,vert_size,,)
                            +----acoustic(volume,bass,treble,
balance,fade,)
```

```
        +----lighting(screen, light、 send_epg)
        +----sensors(living_room, sky, , )
        +----lights(rooms_up, rooms_down, yard, , )
              +----rooms_up(bed1, bed2, bed3, bed4, , )
              +----rooms_down(family, kitchen, living, dining, soho,
garage, , )
              +----yard(front, back)
                  +----bed1(lamp, dimmer, , )
                        +----dimmer＜value＞
        +----comms(netman, intercom, telco, )
              +----netman(send_device_list, send_configuration,
send_snmp_mib, , )
              +----intercom()
              +----telco()
        +----havc(controls_gen, controls_hvac, , )
              +----controls_hvac(a/c, heat, temp, humidity, )
                  +----temp(low, high, hysteresis, , )
        +----utility(meters, energy_mgmt, , )
              +----meters(water, gas, electric, , )
                  +----water＜value＞, gas＜value＞,
electric＜value＞
        +----security(sensors, send_epg, alram, , )
              +----sensors(peripheral, motion, , )
                  +----peripheral(rooms_up, rooms_down, , )
                  +----motion(rooms_up, yard, , )
        +----appliances(microwave, range, over, fridge, freezer, coffee,
toaster, washer, dryer, water-heater, , )
              +----microwave(send_epg, controls, , )
              +----fridge(temp, , )
```

```
                +----water_heater(temp)
            +----convenience(window,curtain_open,door/gate,pool/spa,
bath,fountain,lift,,)
                +----curtain_open＜value＞
        +----server_auto(message,mileage,maintenance,,)
            +----mileage＜data＞
            +----maintenance＜data＞
```

【０１０２】

他の観点で、本発明はネットワークでデバイスーデバイス命令及び制御のために存在する命令語具現の使用を提供する。デバイスは、内部対象及び存在する伝送メカニズムによって、実行時に２進数列を生成するAPIを有する。このような場合、ネットワークで一つのデバイス１４からさらに他のデバイス１４にXML遠隔手順呼び出し(XMLRPC: XML Remote Procedure Calls)を提供するために、存在するアプリケーションインタフェース具現はXMLサービスAPIに対する呼び出しに取り替えられる。従って、本来の具現はXMLサービスAPIのためのラッパ(Wrapper)と同等である。図１８は、またXCE/XMLサービスAPIでラッパに取り替えられたインタフェース具現として、点線内のCALまたはAV/Cのような他の命令語を使用して生成されたアプリケーションを示す。CAL命令語からXMLRPCフォーマットを変える例が下に示されている。

```
-----------------------------------------------------------------------
existing implementation:
void DeviceCALCommand(int command){
            ×
            ×
            /*
            create CAL formatted byte string to represent this
            object/method and output to the wire
            */
            CreateCALFormattedByteString(command);/*  different for
```

```
                                        every protocol*/
        SendCALByteString();  */different for every protocol
*/
}
```

```
wrapping the XML Service API call:
void DeviceCALCommand(int command){
{
        /*
        replace CAL implementation with calls to the XML
ServiceAPI
        */
        CreateXMLMessage(command);  /* always the same */
        sendXMLMessage();           /* always the same */
}
```

【０１０３】

さらに他の観点で、図２３を参照すれば、本発明はネットワーク内の他のデバイス間のデバイス間通信のための標準命令プロトコル及び制御言語翻訳を提供する。情報を共有する他のデバイスのために、前記情報は要請デバイスが解釈できるフォーマットであるべきである。そして、一つのデバイス１２０が他のデバイス２２を制御するために、前記二つのデバイスはお互いの命令を解釈するために共通の言語を使用すべきである。本発明はデータのための共通識別フォーマット及び命令プロトコルを提供する。

【０１０４】

一実施形態で、共通表示またはデータ及び命令プロトコルパッケージする方法が提供され、それにより受信デバイス１２２は伝送されたデータの本来のフォーマットを決定できる。もし受信デバイスが本来のフォーマットを解釈できるならば、その時にデータを直接受信できる。そうでなければ、受信デバイス１２２は翻訳デバイス１２４または要請デバイス１２２が解釈できる望ましいフォーマッ

トにデータを変形するアプリケーションを求められる。前記翻訳デバイス１２４またはアプリケーションは元のデータの本来のフォーマットを決定し、前記データを前記求められるフォーマットで翻訳し、要請デバイス１２２に翻訳したデータを送信する。

【０１０５】

次に、前記要請デバイス１２２は、まるで前記データが元々送信デバイス１２０により要請デバイスの本来の言語フォーマットで提供されたようにデータを処理する。前記要請デバイス１２２は、また要請デバイスの本来のフォーマットで送信デバイス１２０に返信を送ったり翻訳デバイス１２４または送信デバイス１２０の本来のフォーマットで翻訳するアプリケーションを通じてプロキシにより応答を伝送できる。前記翻訳方法は、命令プロトコル、データファイル及びオーディオ/ビデオストリームを含む情報のために使われる。

【０１０６】

前述された共通フォーマットを使用しないデバイスのために、本発明は固い(Non-compliant)デバイスへ/からの命令プロトコルを含むデータの翻訳を提供する。例えば、固いデバイス１２０が柔軟なデバイス１２２にデータを送信する時、前記柔軟なデバイス１２２は前記データの本来のフォーマットの決定に基づいてデータを翻訳できる。例えば、前記柔軟なデバイス１２２はデータ内部の特定のビットパターンのためのデータを調査できる。柔軟なデバイスが既知の固いデバイスにデータを伝送する時、前記柔軟なデバイスは固いデバイスの本来のフォーマットの決定に基づいて伝送する前に前記データを翻訳できる。

【０１０７】

例示的な具現はIP及びHTTPプロトコルを支援するホームネットワークのためのことでありうる。前記ホームネットワークは望ましい機能のためのアプリケーション及び多様なタイプのサービスを得るためにインターネットに接続されたりする。従って、共通フォーマット方法は、インターネット及びホームネットワーク上の動作に対するインターネットプロトコル及び手順と互換性を有するように作られる。

【０１０８】

共通データフォーマットを提供する一例は、ホームネットワークを通じて伝送のためのデータパッケージを生成するXMLを使用している。前記データは命令プロトコル、オーディオまたはビデオストリーム、グラフィックまたはアプリケーションを含む。前記データはXML形態でデータの本来のフォーマット及びパッケージの項目を確認する標準ヘッダでラッピングされる。前記ヘッダは唯一にデータタイプとXMLコードのデータ部分を確認するようにし、それによって前記データは必要に応じて翻訳され、受信後に適当なアプリケーションに提供される。

【０１０９】

ウェブ標準下で、前記確認作業はファイル伝送のタイプ及び項目を確認するためにファイル名拡張を使用するブラウザにより行われる。次に、ブラウザはそのファイルを処理する適当なプラグ-のモジュールを移す。ホームネットワークでXMLは、前述された共通確認方法でIP上の全てのホームネットワーク伝送を提供するデータ伝送を確認するために使われる。

【０１１０】

一方、ホームネットワークを通した全てのデータ伝送の項目を唯一に確認するソフトウェア階層がホームネットワークプロトコルスタックで提供される。前記ソフトウェア層はXMLの代りに使われる。本発明の共通フォーマット及び確認原理は、XMLを使用する実施形態または確認方法としての前記ソフトウェア階層に同一に適用される。

【０１１１】

図２３でデータパッケージ伝送を受信すれば、受信デバイス１２２はその中のデータのフォーマットを決定するデータパッケージのXML確認ヘッダを調べる。もし前記データがデバイス１２２により認識できるフォーマットであれば、XML確認ヘッダ情報は捨てられ、前記デバイスはデータを直接処理する。そうでなければ、前記デバイス１２２は受信されたXMLパッケージをXML翻訳要請パッケージに変換し、翻訳サーバデバイス１２４に要請パッケージ及び前記データを送信する。

【０１１２】

前記翻訳サーバデバイス１２４は前記データを翻訳し、前記翻訳したデータを

XML翻訳応答パッケージに変換する。次に、前記翻訳サーバ１２４は要請デバイス１２２に応答パッケージを回送する。翻訳エラーの場合に、前記翻訳サーバ１２４は要請デバイス１２２に翻訳応答エラー状態を提供できる。翻訳されたデータを受信すれば、前記要請デバイス１２２は翻訳されたデータを応答パッケージで処理する。

【０１１３】

XMLデータパッケージまたはパケットの例は次の通りである：

＜IDENTITY type＝format＝AV/c＞...packet data...＜/IDENTITY＞

翻訳要請パッケージまたはパケットの例は次の通りである：

＜TRANSLATION REQUEST type＝Command format＝CAL＞

＜IDENTITY type＝Command format＝AV/C＞...packet data

＜/IDENTITY＞

＜/TRANSLATION REQUEST＞

翻訳要請パッケージまたはパケット例は次の通りである：

＜TRANSLATION RESPONSE type＝Command format＝CAL＞...packet data

＜/TRANSLATION RESPONSE＞

伝送応答エラー状態パッケージまたはパケットの例は次の通りである：

＜TRANSLATION RESPONSE type＝Command format＝CAL＞...packet data...

＜ERROR condition＝Unrecognized command＞Translation could not be performed＜/ERROR＞

＜/TRANSLATION RESPONXE＞

【０１１４】

さらに、図２４でテーブル３は、パッケージまたはパケットタイプ及びフォーマットの部分的なリストを含む。

【０１１５】

翻訳サービスを提供するために、翻訳サーバ１２４はDHCPサーバの方法と類似な方法でネットワーク構成の間にネットワークで確認される。前記翻訳サーバ１２４は、ネットワークが構成された後一定期間ネットワーク内の全てのデバイスにそのIPアドレスを放送する。翻訳サービスと互換できる全てのデバイス１２０

、１２２は、ネットワークをブーティングする間にネットワークを通じて放送する翻訳サーバ１２４のIPアドレスを貯蔵する。

【０１１６】

一方、要請デバイス１２２はホームネットワークを通じて翻訳要請を放送できる。ネットワークで翻訳要請を受信する全ての翻訳サーバ１２４は要請デバイス１２２に翻訳応答を送信することによって翻訳要請に応答できる。次に、要請デバイス１２２は応答翻訳サーバ中で一つの翻訳サーバ１２４を選択する。一例として、要請デバイス１２２は翻訳要請に応答する最初の翻訳サーバ１２４を選択する。また他の例で翻訳サーバ１２４は、翻訳要請を満たす翻訳サーバ１２４の選択のためにかれら自体間でそして/または要請デバイス１２２と交渉できる。

【０１１７】

本発明のさらに他の実施形態で、多重の翻訳サーバ１２４が全ての翻訳要請を行うために使われる。例えば、単一の翻訳サーバ１２４が全ての要請を翻訳する性能を有しない場合もありうる。この場合、各翻訳サーバのアドレス及び各翻訳サーバが提供できる翻訳サービスのタイプを確認する必要がある。各デバイス１２０、１２２は、全ての翻訳サーバIPアドレスリストと各翻訳サーバ１２４が提供する翻訳サービスタイプに相応するリスト、そして選択的に関連された翻訳アプリケーションを貯蔵できる。

【０１１８】

効率のために、もし送信デバイス１２０が送信デバイス１２０フォーマットと違う本来フォーマットを使用することと知られた受信デバイス１２２にデータを伝送することを希望するならば、前記送信デバイス１２０は翻訳サーバ１２４を通じたプロキシにより受信デバイス１２２にデータを伝送できる。前記送信デバイス１２０は、翻訳サーバ１２４に伝送要請命令と類似に翻訳サーバ１２４に命令を伝送し、翻訳されたデータに対する目的地として受信デバイス１２２のアドレスを含む。

【０１１９】

受信デバイス１２２がデータストリームの翻訳を要求する場合には、送信デバイス１２０は直接翻訳サーバ１２４にデータストリームをルーティングでき、前

記翻訳サーバ１２４は前述されたように受信デバイス１２２に翻訳されたデータを順次に伝送する。他の一方では、前記送信デバイス１２０は前記受信デバイス１２２にデータストリームを伝送でき、次に受信デバイス１２２は翻訳及び前記受信デバイス１２２に翻訳されたデータを回送するために翻訳サーバ１２４にデータストリームをルーティングする。

【０１２０】

説明中で、制御メカニズムは分配され、協調的なハイパーメディア情報システムのためのアプリケーションーレベルプロトコルを提供するHTTP１．１に基づく。HTTPは多くのタスクのための幅広い使用で一般的で無状態(stateless)で対象向きのプロトコルである。HTTPの特徴は、伝送されたデータと独立的にシステムが構成されるようにするデータ表現の分類及び交渉である。望ましくは、ホームネットワーク上でデバイス及びアプリケーションにより使われたネットワークプロトコルはIP(Internet Protocol)である。しかし他のプロトコルも使われる。

【０１２１】

本発明は望ましい実施の形態で詳細に説明されたが、他の変形も可能である。従って、特許請求の範囲は本発明の望ましい実施の形態により限定されてはいけない。

【図面の簡単な説明】

【図１】　本発明の第１観点に係るネットワークの具現のためのブロック図である。

【図２】　デバイス制御及び通信概要の第１実施形態に係る図１のブロック図である。

【図３】　多数のクライアントとサーバデバイスを含む本発明に係るホームネットワークシステムに対する第１実施形態を示すブロック図である。

【図４】　図３のクライアントデバイス及びサーバデバイス具現の第１実施形態を示すブロック図である。

【図５】　クライアントデバイス具現の第１実施形態を示す図面である。

【図６】　サーバデバイス具現の第１実施形態を示す図面である。

【図７】　相互間に通信及び制御を可能にするネットワークサーバデバイス

の第２実施形態を示すブロック図である。

【図８】 ネットワークでソースサーバデバイス、シンクサーバデバイス及びクライアントデバイスを含むオーディオ/ビデオモデルの構造に対する第１実施形態を示すブロック図である。

【図９】 オーディオ/ビデオモデルの他の実施形態を示す図面である。

【図１０】 ネットワークデバイスのための性能データテーブルの実施形態を示す図面である。

【図１１】 図１１は、ネットワークデバイスのための特性データテーブルの実施形態を示す図面である。

【図１２】 ネットワークデバイス間で命令メッセージを発生させるビルディングブロックに対する第１実施形態の構成を示す図面である。

【図１３】 命令メッセージを発生させる図１２に係るビルディングブロックの他の実施形態の構成を示す図面である。

【図１４】 ネットワーククライアント及びサーバデバイス間で相互作用の第３実施形態を示す図面である。

【図１５】 ネットワークデバイスインタフェースのAPI拡張を定義する第１実施形態のブロック図である。

【図１６】 他のサーバデバイスのインタフェース説明文書をアクセスするサーバデバイスアプリケーションのための第１実施形態の構造を示す図面である。

【図１７】 制御器サーバデバイスと制御されたサーバデバイスとの間の内部ーデバイス制御構造の他の実施形態を示す図面である。

【図１８】 ネットワークデバイス間のAPIレベルで通信スタックでウェブ標準共通ミドルウェア階層を提供するXMLプロトコルの具現を示す図面である。

【図１９】 サーバデバイス間命令制御構造のまた他の具現を示す図面である。

【図２０】 デバイスインタフェースライブラリとホームデバイスのための電化製品データベースとの関係を示す図面である。

【図２１】 デバイスインタフェース定義に対する階層的形態の具現を示す

図面である。

【図２２】　図２１のデバイスインタフェース定義で階層の第１実施形態を示す図面である。

【図２３】　伝送器及び受信器デバイス間で共通伝送及び解釈手順を示す図面である。

【図２４】　本発明の第１観点に係る翻訳サービスを提供するためのパケットタイプとフォーマットの部分的なリストテーブルの第１実施形態を示す図面である。

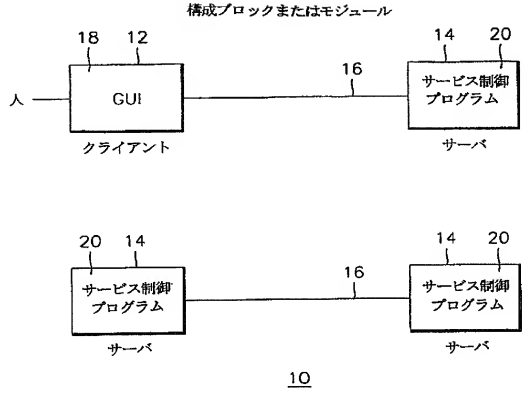
【符号の説明】

１０　ネットワーク
１２　クライアントデバイス
１４　サーバデバイス
１６　通信リンク
１８　ＧＵＩディスプレイ
２０　サーバ制御プログラム
２２　グラフィック制御対象（ＧＣＯ）使用者インタフェース説明書
２４　クライアントデバイスレンダラ
２６　制御状態データ
２８　クロック
３０　命令語インタフェース
３２　データストリームソースハードウェア
３４　データストリームシンクハードウェア
３６　セッション管理者
４０　サービスの機能的規格ブロック
４２　メッセージ要素が構成されるブロック
４４　産業標準化フォーマットブロック
４６　メッセージ圧縮ブロック
４８　メッセージ文字列構成ブロック
５０　ソフトウェアクライアント制御プログラム

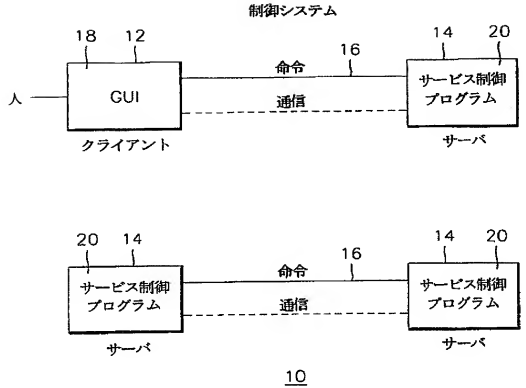
５２，５４，５８，６０　ブロック
５６，６２　ルックーアップテーブル
６４　ライブラリデバイス
６６　通信スタック
６８　XML層OUT
７０　XML層IN
７２　XMLインタフェース
７４　XMLパーサ
７６　XMLRPCコーデック
７８　インタフェースフェッチャ
７９　ホームネットワーク対象要請ブローカ
８０　ホームネットワークインタフェースライブラリ
８２　制御器アプリケーションプログラムコード
８４　アプリケーションプログラムコード
８６　ホームネットワークデバイスウェブサーバ
８８　固有ルックアップテーブル
９０　ハンドラ
９２　ハードウェアサービス
９４　固有インタフェース
９６　第３デバイス
９８　ミドルウェア階層
１００　データベース
１０２　ＣＥデータベース
１０４　ＸＣＥデータベース
１０６　ホームネットワークインタフェースライブラリ
１０８　製造会社手段
１１２，１１４，１１６，１１８　階層
１２０　送信デバイス
１２２　要請デバイス

１２４　翻訳デバイス

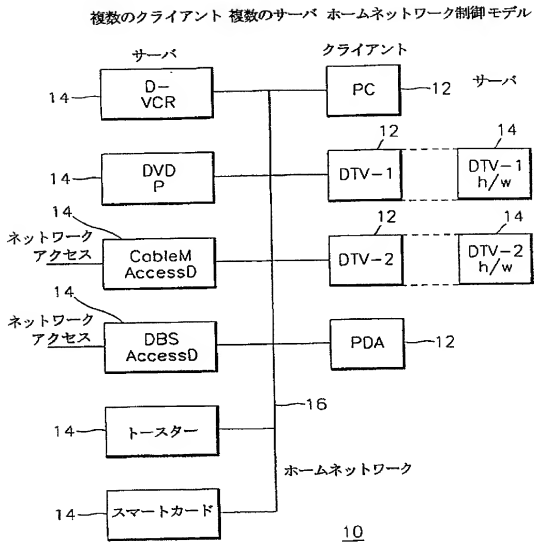
【図１】



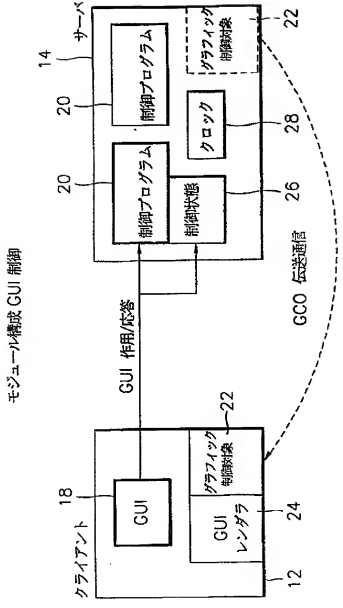
【図２】


制御システム
18
12
16
14
20
人
GUI
命令
通信
サービス制御
プログラム
クライアント
サーバ
20
14
16
14
20
サービス制御
プログラム
命令
通信
サービス制御
プログラム
サーバ
サーバ
10

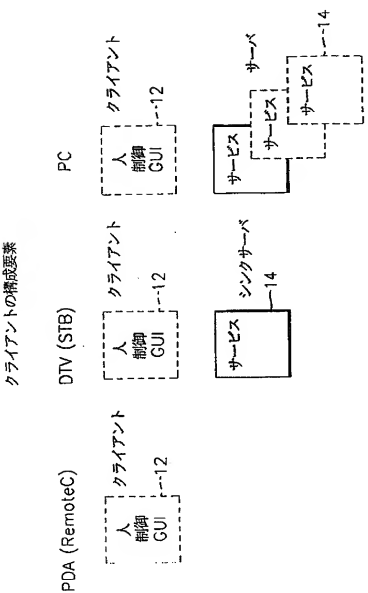
【図３】


複数のクライアント 複数のサーバ ホームネットワーク制御モデル
サーバ
クライアント
D−
VCR
14
PC
12
サーバ
12
14
DVD
P
14
DTV−1
DTV−1
h/w
14
ネットワーク
アクセス
CableM
AccessD
DTV−2
DTV−2
h/w
ネットワーク
アクセス
DBS
AccessD
PDA
12
16
トースター
ホームネットワーク
スマートカード
10

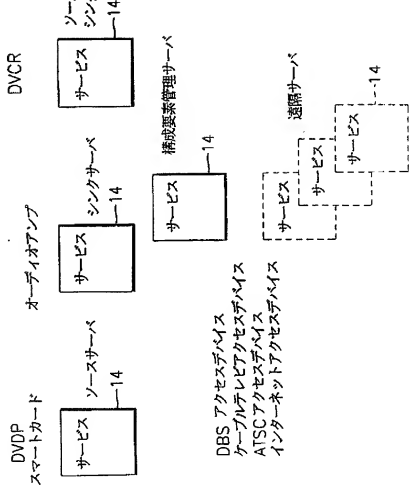
【図４】


モジュール構成 GUI 制御
クライアント
18
GUI
GUI
レンダラ
グラフィック
制御対象
22
12
24
GUI 作用/応答
GCO 伝送通信
サーバ
14
20
制御プログラム
制御状態
26
クロック
28
グラフィック
制御対象
22

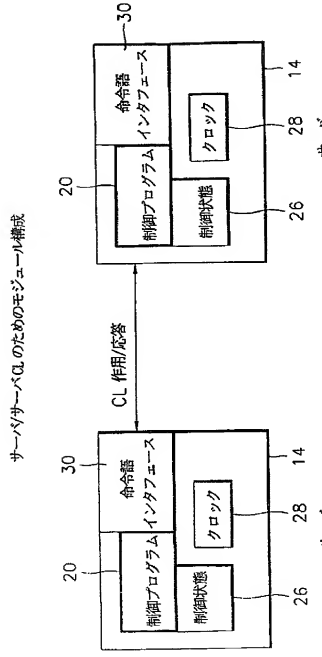
【図５】


クライアントの構成要素
PDA (RemoteC)
DTV (STB)
PC
クライアント
入
制御
GUI
12
サービス
シンクサーバ
14
サーバ
サービス
14

【図６】


サーバの構成要素（Boxes）
DVDP
スマートカード
サービス
ソースサーバ
14
オーディオアンプ
サービス
シンクサーバ
14
DVCR
サービス
ソースまたは
シンクサーバ
14
構成要素管理サーバ
サービス
14
DBS アクセスデバイス
ケーブルテレビアクセスデバイス
ATSC アクセスデバイス
インターネットアクセスデバイス
サービス
遠隔サーバ
サービス
サービス
14

【図７】


サーバ/サーバCL のためのモジュール構成
CL 作用/応答
20
30
命令語
インタフェース
制御プログラム
制御状態
クロック
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28
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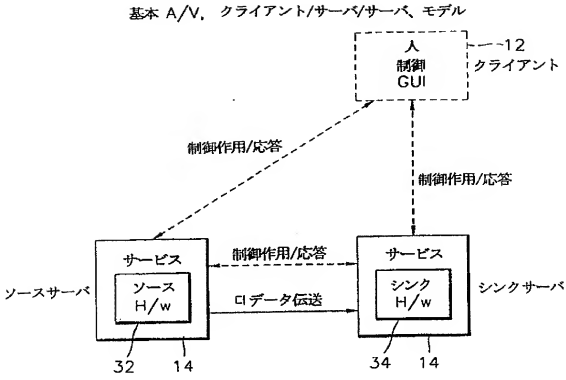
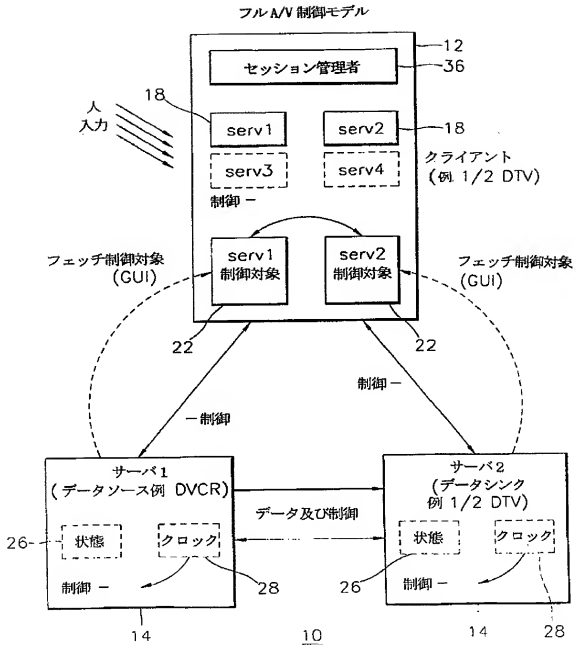
サーバ

【図８】


基本 A/V, クライアント/サーバ/サーバ、モデル
人
制御
GUI
12
クライアント
制御作用/応答
制御作用/応答
サービス
ソース
H/w
制御作用/応答
データ伝送
サービス
シンク
H/w
ソースサーバ
シンクサーバ
32
14
34
14

【図９】


フルA/V制御モデル
12
セッション管理者
36
18
人
入力
serv1
serv2
18
serv3
serv4
クライアント
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制御－
フェッチ制御対象
(GUI)
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制御対象
serv2
制御対象
フェッチ制御対象
(GUI)
22
22
制御－
－制御
サーバ1
(データソース例 DVCR)
データ及び制御
サーバ2
(データシンク
例 1/2 DTV)
26
状態
クロック
状態
クロック
制御－
28
26
制御－
14
10
14
28

【図１０】

テーブル１：性能テーブル

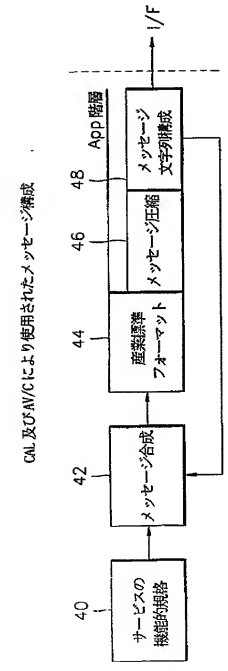
Service	Sink/Source
Service A	Sink
Service B	Source
Service C	Source
Service D	Sink

テーブル２：特性テーブル

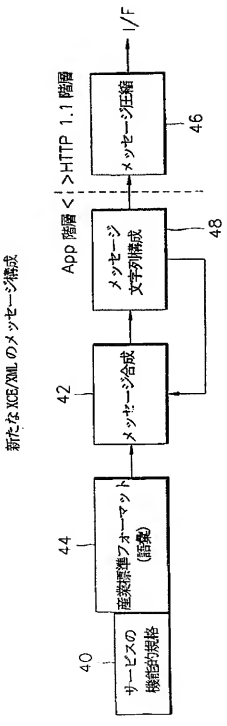
名称	長さ	値
DeviceManufacturer	20 chars	Device manufacturer's name
ManufacturerURL	60 chars	device manufacturer's home page URL
manufacturerIcon	20 chars	Name of Device manufacturer's Icon
DeviceName	30 chars	Device name
DeviceModel	20 chars	Device model number
DeviceType	20 chars	device category
DeviceLocation	30 chars	device group or location
DefaultSource	15 chars	Data type, Default source device (IP address)
DefaultSink	15 chars	Data type, Default sink device (IP address)
DeviceIcon	20 chars	Name of device icon

【図１２】

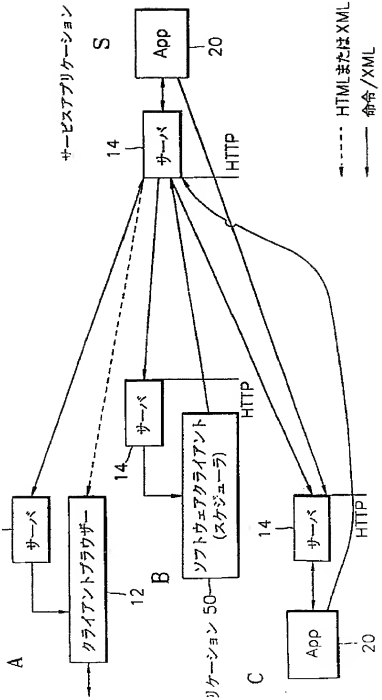
CAL及びAN/Cにより使用されたメッセージ構成



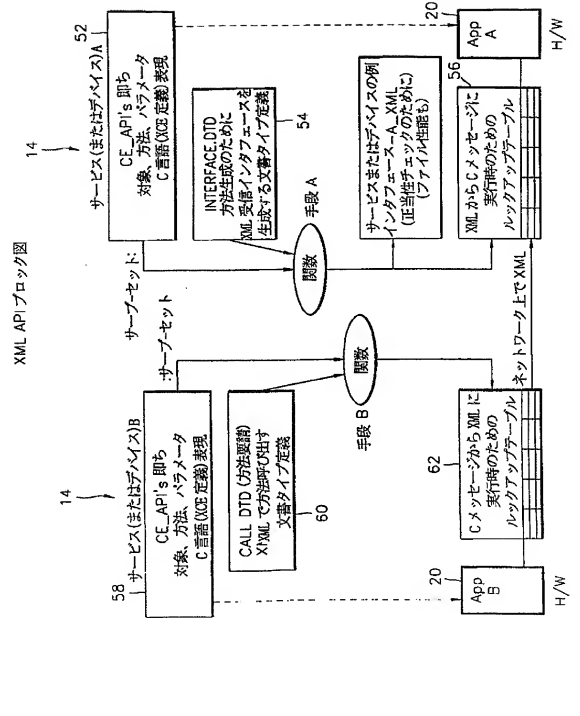
【図１３】


新たなXCE/XML のメッセージ構成
40
サービスの機能的規格
44
産業標準フォーマット(語彙)
42
メッセージ合成
App 階層
メッセージ文字列構成
48
>HTTP 1.1 階層
メッセージ圧縮
46
I/F

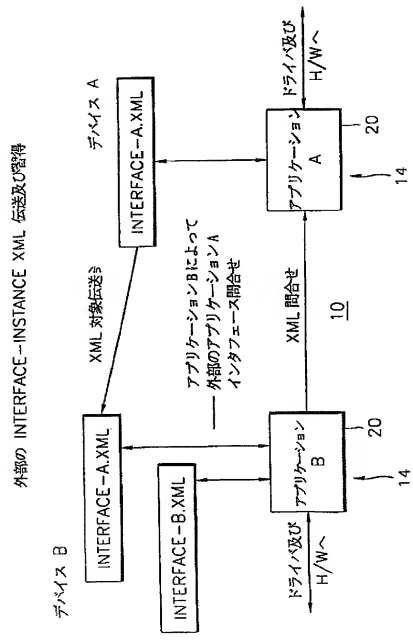
【図１４】


Web及びXMLを使用するクライアントサーバモデル
サービスアプリケーション
S
App
20
14
サーバ
HTTP
HTMLまたはXML
命令/XML
A
クライアントブラウザー
12
人
B
サーバ
14
ソフトウェアクライアント
(スケジューラ)
サービスアプリケーション 50
HTTP
C
14
サーバ
HTTP
App
20

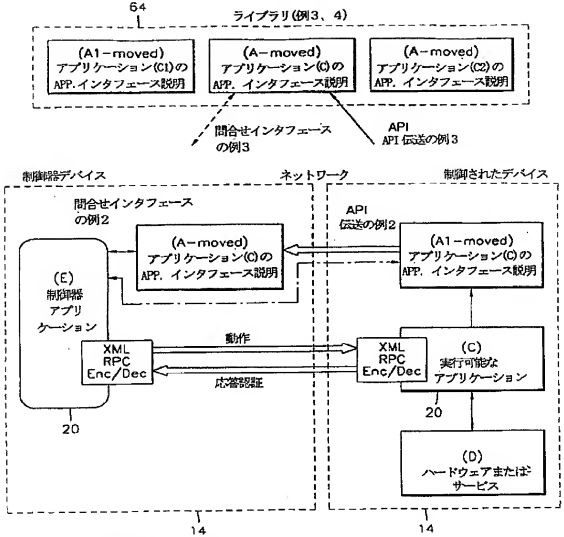
【図１５】


XML API ブロック図
14
サービス(またはデバイス)A
52
CE_API's 即ち
対象、方法、パラメータ
C言語(VCE定義)表現
サーブセット
INTERFACE.DTD
方法生成のために
XML 受信インタフェースを
生成する文書タイプ定義
54
手段 A
関数
サービスまたはデバイスの例
インタフェース-A_XML
(正当性チェックのために)
(ファイル性能も)
56
XML からCメッセージに
実行時のための
ルックアップテーブル
20
App
A
H/W
14
サービス(またはデバイス)B
58
CE_API's 即ち
対象、方法、パラメータ
C言語(VCE定義)表現
サーブセット
CALL DTD (方法要請)
XMLで方法呼び出す
文書タイプ定義
60
手段 B
関数
ネットワーク上でXML
62
Cメッセージから XML に
実行時のための
ルックアップテーブル
20
App
B
H/W

【図１６】


外部の INTERFACE－INSTANCE XML 伝送及び登録
デバイス B
INTERFACE－A.XML
INTERFACE－B.XML
XML 対象伝送
デバイス A
INTERFACE－A.XML
アプリケーションBによって
外部のアプリケーションA
インタフェース照合せ
XML 問合せ
10
アプリケーション B
アプリケーション A
20
14
ドライバ及び H/W へ
ドライバ及び H/W へ

【図１７】



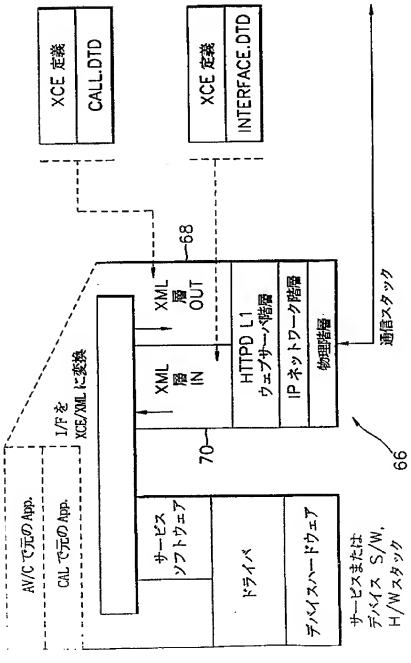
例1．(E)により遠隔で問合せるためのXMLアプリケーション−Cインタフェース(A)．

例2．(E)により局部的に問合せるためのXMLアプリケーション−Cインタフェース(A)を制御器に移動

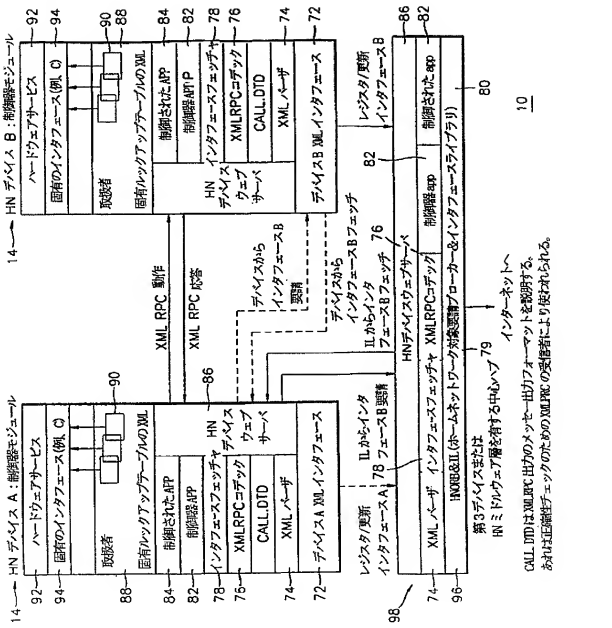
例3．(E)により遠隔で問合せるためのXMLアプリケーション−Cインタフェース(A)．を第3デバイス−全てのインタフェースのための集合場所(ライブラリ)に移動ライブラリは直接制御動作及び応答が有用に関したアプリケーションの住所(URL)を有すべきである

例4．例3と同じであるが、‘間接的な制御動作(及び応答)がライブラリデバイスで命令される．この場合にライブラリは‘送達者’と共に使われる

【図１８】


XCE/XML プロトコルスタック
AV/C で元の App.
CAL で元の App.
I/F を XCE/XML に変換
サービス ソフトウェア
ドライバ
デバイスハードウェア
サービスまたは デバイス S/W, H/W スタック
70
XML 層 IN
XML 層 OUT
68
HTTPD L1 ウェブサーバ階層
IP ネットワーク階層
物理階層
66
通信スタック
XCE 定義
CALL.DTD
XCE 定義
INTERFACE.DTD

【図１９】


14 HN デバイス A：制御器モジュール
ハードウェアサービス
92
固有のインタフェース(例 C)
94
現装者
90
88
固有ルックアップテーブルのXML
84
制御されたAPP
82
制御器APP
インタフェースフェッチャ
78
XMLRPCコデック
76
CALL.DTD
XMLパーザ
74
デバイスA XMLインタフェース
72
HN デバイス ウェブ サーバ
86
XML RPC 動作
XML RPC 応答
デバイスから インタフェースB 要請
デバイスから インタフェースB フェッチ
IIからインタ フェースB フェッチ
76
82
HNデバイスウェブサーバ
14 HN デバイス B：制御器モジュール
ハードウェアサービス
92
固有のインタフェース(例 C)
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固有ルックアップテーブルのXML
84
制御されたAPP
82
制御器APP
インタフェースフェッチャ
78
XMLRPCコデック
76
CALL.DTD
XMLパーザ
74
デバイスB XMLインタフェース
72
HN デバイス ウェブ サーバ
レジスタ/更新 インタフェースA
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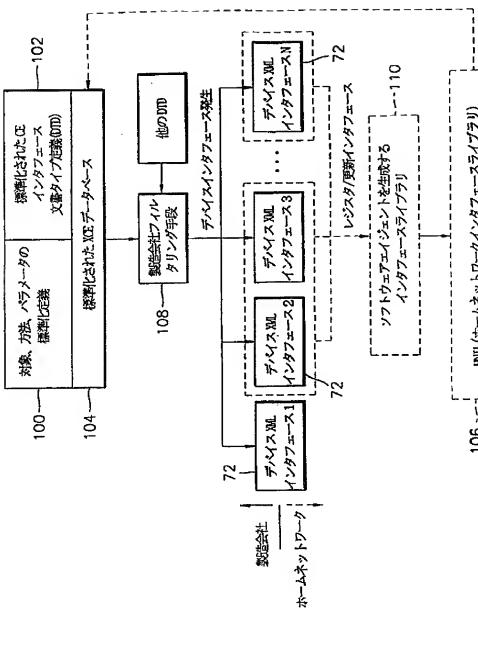
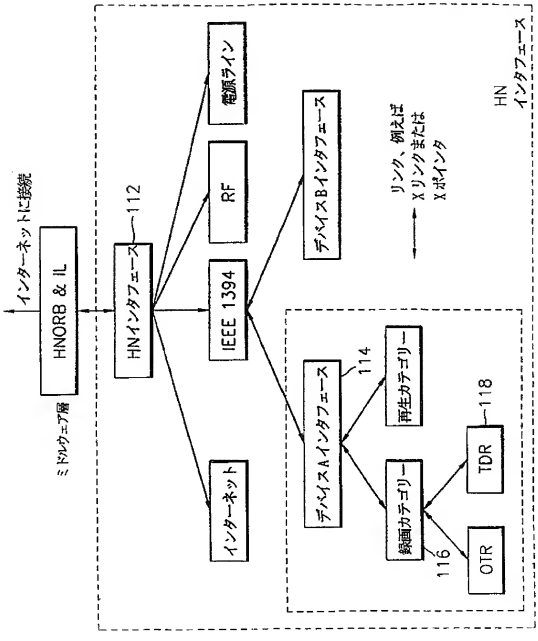
IIからインタ フェースB要請
98
XMLパーザ
インタフェースフェッチャ
XMLRPCコデック
制御器APP
制御されたAPP
86
82
74
HNとIIIホームネットワーク対応要請ブローカー&インタフェースライブラリ
96
80
レジスタ/更新 インタフェースB
第3デバイスまたは HNミドルウェア層を有する中心ハブ
79
インターネットへ
10
CALL.DTDはXML RPC出力のメッセージ出力フォーマットを記述する。
あらゆる互換性チェックのためのXML RPCの受信者により使われられる。

【図２０】


インタフェースライブラリ&XCEデータベースの関係
対象、方法、パラメータの標準化定義
標準化されたXCEインタフェース文書タイプ定義(DTD)
標準化されたXCEデータベース
100
102
104
製造会社プロファイルダウンロード手段
108
他のDTD
デバイスインタフェース発生
デバイスXMLインタフェース1
デバイスXMLインタフェース2
デバイスXMLインタフェース3
デバイスXMLインタフェースN
72
レジスタ/更新インタフェース
ソフトウェアエージェントを生成するインタフェースライブラリ
110
BNIL(ホームネットワークインタフェースライブラリ)
106
インタフェースライブラリ&XCEデータベースの関係サブセット
製造会社
ホームネットワーク

【図２１】


インターネットに接続
HNORB & IL
ミドルウェア層
HNインタフェース
112
インターネット
IEEE 1394
RF
電源ライン
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録画カテゴリー
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TDR
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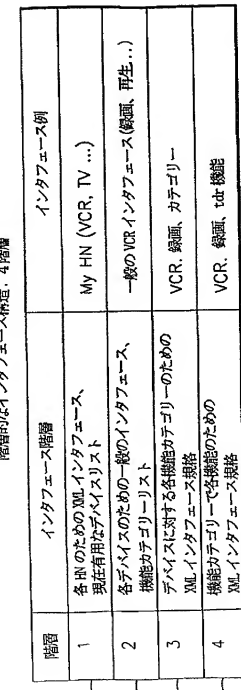
Xリンクまたは
Xポインタ
HN
インタフェース
階層的なIL&デバイスインタフェースの例

【図２２】


階層的なインタフェース構造．4階層
階層
インタフェース階層
インタフェース例
1
各HNのためのXMLインタフェース、現在有用なデバイスリスト
My HN (VCR, TV ...)
2
各デバイスのための一般のインタフェース、機能カテゴリーリスト
一般のVCRインタフェース(録画、再生...)
3
デバイスに対する各機能カテゴリーのためのXMLインタフェース規格
VCR、録画、カテゴリー
4
機能カテゴリーで各機能のためのXMLインタフェース規格
VCR、録画、tdt 機能
112
114
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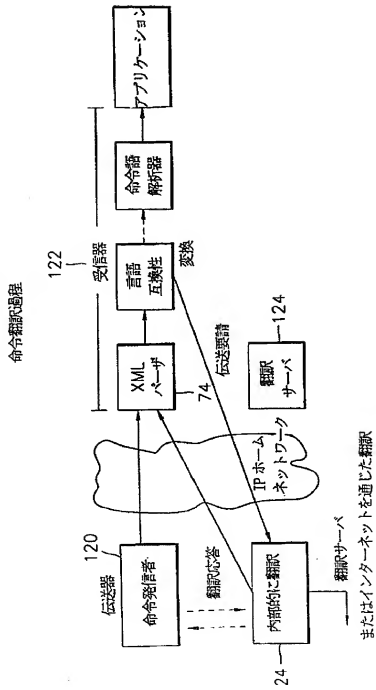
【図２３】


命令翻訳過程
120
伝送器
命令発/信者
翻訳応答
124
内部的に翻訳
翻訳サーバ
または インターネットを通じた翻訳
IP ホーム ネットワーク
122
受信器
XML パーザ
74
言語 互換性
変換
伝送言語
翻訳 サーバ
124
命令語 解釈器
アプリケーション

【図２４】

テーブル３：フォーマットとタイプ例

タイプ	フォーマット
命令	CAL, AV/C, X−10
映像	jpeg, gif, bitmap, tiff
言語	English, French, etc
ビデオ_ストリーム	mpeg2
ビデオ_クリップ	avi, quickime, mpeg
テキスト	html, plain
オーディオ	wav, aiff
アプリケーション	maword, pdf, postscript, gzip

【国際調査報告】

INTERNATIONAL SEARCH REPORT

International application No. PCT/KR 99/00221

A. CLASSIFICATION OF SUBJECT MATTER

IPC[7]: H 04 N 7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[7]: H 04 N; H 04 L; G 06 F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5546584 A (LUNDIN et al.) 13 August 1996 (13.08.96), abstract; fig. 1-4	1,9,12
A	WO 96/21189 A1 (COMPUSERVE) 11 July 1996 (11.07.96), claim 1; fig. 1A.	9
A	EP 0814403 A1 (H.P) 29 December 1997 (29.12.97), abstract; fig. 1.	1
A	EP 0784271 A2 (NEC) 16 July 1997 (16.07.97), claim 3; fig. 1.	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
„A" document defining the general state of the art which is not considered to be of particular relevance
„E" earlier application or patent but published on or after the international filing date
„L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
„O" document referring to an oral disclosure, use, exhibition or other means
„P" document published prior to the international filing date but later than the priority date claimed

„T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
„X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
„Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
„&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 April 2000 (19.04.00)	03 May 2000 (03.05.00)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR 99/00221

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				AU	B2	666165	05-02-1998
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				JP	A2	9190411	22-07-1997
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【誤訳訂正書】
【提出日】平成19年10月18日(2007.10.18)
【誤訳訂正１】
【訂正対象書類名】明細書
【訂正対象項目名】特許請求の範囲
【訂正方法】変更
【訂正の内容】
【特許請求の範囲】
【請求項１】　ホームネットワーク上でサービスを行うための方法において、
(a) 第１ホームデバイスを前記ホームネットワークに接続する段階と、
(b) 第２ホームデバイスを前記ホームネットワークに接続する段階と、
(c) 複数のアプリケーションインタフェース説明データ対象を含むデータベースを提供する段階とを含み、各アプリケーションインタフェース説明データ対象は前記ネットワークに接続された一つまたはそれ以上の他のホームデバイスによるホームデバイスの命令及び制御のための情報を含み、
(d) 前記第１ホームデバイスが前記データベースで前記第２ホームデバイスのためのアプリケーションインタフェース説明データ対象をアクセスする段階と、
(e) 前記第１ホームデバイスが前記ネットワークを通じて前記第２ホームデバイスのために前記アプリケーションインタフェース説明データ対象を使用して前記第２ホームデバイスに命令及び制御データを伝送する段階とをさらに含み、それにより前記第１及び第２ホームデバイスが自律的に前記サービスを行うことを特徴とするホームネットワーク上でサービスを行うための方法。
【請求項２】　前記構造化されたフォーマットはXMLフォーマットを含むことを特徴とする請求項１に記載の方法。
【請求項３】　前記データベースは前記ネットワークに接続されたデータベースデバイスに含まれることを特徴とする請求項１に記載の方法。
【請求項４】　(i) 前記第１ホームデバイスは前記第１アプリケーションインタフェース説明データ対象を貯蔵し、
(ii) 前記第２ホームデバイスは前記第２アプリケーションインタフェース説明データ対象を貯蔵し、
(iii) 前記(c)段階は、前記データベースデバイスに前記第１及び第２ホームデバイスのための前記アプリケーションインタフェース説明データ対象を伝送するために前記第１及び第２ホームデバイスを問い合わせることを含む段階により前記データベースを形成する初期化段階を含むことを特徴とする請求項３に記載の方法。
【請求項５】　前記(d)段階は、ネットワークを通じて前記データベースから前記第２ホームデバイスに前記第１ホームデバイスのための第１アプリケーションインタフェース説明データ対象を提供する段階を含むことを特徴とする請求項１に記載の方法。
【請求項６】　前記(e)段階は、ネットワークを通じて前記データベースから前記第

１ホームデバイスに前記第２ホームデバイスのための第２アプリケーションインタフェース説明データ対象を提供する段階を含むことを特徴とする請求項１に記載の方法。

【請求項７】　三つまたはそれ以上のホームデバイスを前記ネットワークに接続する段階として、少なくとも一つのホームデバイスは前記ネットワークを通じて複数のホームデバイスに命令及び制御データを伝送するための複数のホームデバイスのアプリケーションインタフェース説明データ対象を問い合わせるためにデータベースをアクセスする段階をさらに含むことを特徴とする請求項１に記載の方法。

【請求項８】　各アプリケーションインタフェース説明データ対象は構造化されたフォーマットでデータを含むことを特徴とする請求項１に記載の方法。

【請求項９】　サービスを提供するためのネットワークシステムにおいて、

(a) 相互通信するデバイスにより使われうる通信媒体を提供する物理層と、

(b) 第１ホームデバイスと、

(c) 第２ホームデバイスと、

(d) 多数のアプリケーションインタフェース説明データ対象を含むデータベースとを含み、

それぞれのアプリケーションインタフェース説明データ対象は、前記ネットワークに接続された一つまたはそれ以上の他のデバイスによるホームデバイスの命令及び制御のための構造化されたフォーマットでの情報を含み、

前記第２ホームデバイスは、前記データベースで前記第１ホームデバイスのための第１アプリケーションインタフェース説明データ対象をアクセスし、前記第１アプリケーションインタフェース説明データ対象を使用して前記第２ホームデバイスから前記第１ホームデバイスに制御及び命令データを伝送するためのアプリケーション制御手段を含み、

前記第１ホームデバイスは、前記データベースで前記第２ホームデバイスのための第２アプリケーションインタフェース説明データ対象をアクセスし、前記第２アプリケーションインタフェース説明データ対象を使用して前記第１ホームデバイスから前記第２ホームデバイスに制御及び命令データを伝送するためのアプリケーション制御手段を含み、

それにより前記第１及び第２ホームデバイスは自律的に前記サービスを行うことを特徴とするサービスを提供するためのネットワークシステム。

【請求項１０】　前記構造化されたフォーマットはXMLフォーマットを含むことを特徴とする請求項９に記載のネットワークシステム。

【請求項１１】　前記データベースはデータベースデバイスに貯蔵されることを特徴とする請求項９に記載のネットワークシステム。

【請求項１２】　(i) 前記第１ホームデバイスは第１アプリケーションインタフェース説明データ対象を貯蔵し、

(ii) 前記第２ホームデバイスは第２アプリケーションインタフェース説明データ対象を貯蔵し、

(iii) 前記データベースデバイスは、データベースデバイスに各々前記第１及び第２アプリケーション説明対象を伝送するために前記第１及び第２ホームデバイスを問い合わせることによって前記データベースを形成することを特徴とする請求項１１に記載のネットワークシステム。

【請求項１３】　前記第２ホームデバイスのアプリケーション制御手段は、前記データベースから第１ホームデバイスのための第１アプリケーションインタフェース説明データ対象を得ることを特徴とする請求項９に記載のネットワークシステム。

【請求項１４】　前記第１ホームデバイスのアプリケーション制御手段は、前記データベースから第２ホームデバイスのための第２アプリケーションインタフェース説明データ対象を得ることを特徴とする請求項９に記載のネットワークシステム。

【請求項１５】　少なくとも一つのホームデバイスは、ネットワークを通じて複数のホームデバイスに命令及び制御データを伝送するための複数のホームデバイスのアプリケーションインタフェース説明データ対象を問い合わせるためにデータベースをアクセスする三つまたはそれ以上のホームデバイスをさらに含むことを特徴とする請求項９に記載の

ネットワークシステム。

【請求項１６】 それぞれのアプリケーションインタフェース説明データ対象は構造化されたフォーマットでデータを含むことを特徴とする請求項９に記載のネットワークシステム。

【請求項１７】 前記構造化されたフォーマットはXMLフォーマットを含むことを特徴とする請求項９に記載のネットワークシステム。

【請求項１８】 ネットワーク上でサービスを行うための方法において、

(a) デバイスが前記ネットワークに接続されたときにアプリケーションインタフェース説明データを取得するために前記デバイスに問い合わせる段階を含み、前記アプリケーションインタフェース説明データは前記ネットワークに接続された他のデバイスによる前記デバイスの命令及び制御のための情報を含み、

(b) 前記取得したアプリケーションインタフェース説明データをデータベースに貯蔵する段階と、

(c) 第１デバイスのアプリケーションインタフェース説明データを前記データベースから第２デバイスに提供する段階とをさらに含み、前記第２デバイスは命令及び制御のために前記第１デバイスのアプリケーションインタフェース説明データを使用して前記第１デバイスと相互作用することを特徴とするネットワーク上でサービスを行うための方法。

【誤訳訂正２】
【訂正対象書類名】明細書
【訂正対象項目名】０００２
【訂正方法】変更
【訂正の内容】
【０００２】
【従来の技術】

一般的に、ネットワークは通信リンクと前記通信リンクと接続された通信能力を有する多様なデバイスを含む。前記デバイスは、コンピュータ、周辺装置、ルータ、貯蔵装置、そしてプロセッサと通信インタフェースを具備した製品を含む。ネットワークの一実施形態として多様なデバイスが相互接続された家庭用ホームネットワークを挙げられる。普通の家庭はパソコン及び家庭内で典型的に見つけられるホームデバイスを含むいろいろなデバイスを含むことができる。用語としての”デバイス”は、典型的に論理デバイスまたは機能性及びデータを交換する能力を備える他の装置を含み、全てのホームデバイスだけでなく汎用コンピュータも含むことができる。ホームデバイスは保安システム、映画館装備、TV、VCR、ステレオ装備、デジタル衛星サービス(DSS: Digital Satellite Services)とも知られた衛星放送サービス(DBSS: Direct Broadcast Satellite Services)、散水システム、照明システム、電子レンジ、食器洗い器、オーブン/ストーブ、洗濯機/乾燥器及び自動車内の処理システムのような電子デバイスを含む。

【誤訳訂正３】
【訂正対象書類名】明細書
【訂正対象項目名】００２４
【訂正方法】変更
【訂正の内容】
【００２４】

クライアントデバイス１２とサーバデバイス１４は、例えばDTVのように一つのユニットで物理的に一緒に結びつけることができる。その場合に、前記サーバデバイス１４はサーバハードウェアを制御するための制御プログラム２０を含み、前記クライアントデバイス１２は少なくともサーバハードウェアの制御及び命令のためにサーバ制御プログラム２０に制御使用者インタフェースを提供する。図５はクライアントデバイス１２の例を示す図面であって、(１) GUIディスプレイのためのPDA(RemoteC)、(２) GUIをディスプレイし、オーディオ及び/またはビデオプログラムストリーム目的地サーバで構成された受信側サーバを含むDTV(STB)、(３) GUIをディスプレイし、多重のサービスを提供するために少

なくとも一つのサーバデバイスを含むPCを含むことができる。DTVまたはPCクライアントデバイス内のハードウェアあるいは実行できるものは他のクライアントデバイスによっても制御される。図６はサーバデバイス１４の例を示す図面であって、（１）送信側のサーバデバイスとしてのDVDP SmartCard、（２）受信側のサーバデバイスとしてのオーディオ増幅器、（３）送信側または受信側のサーバデバイスとしてのDVCR、（４）遠隔サーバデバイスを管理するための管理サーバを含む。前記管理サーバは例えばDSB-STB、ケーブルTV-STB、またはATSC-STBを含むことができる。このようなデバイスはSTB内部作業のローカル制御または管理のための管理サーバを含む。さらに、外部ネットワークを通じてアクセスされた外部サーバは、例えばVideo-on-Demand、Enhanced-TV及びインターネット商取引のようなサービスのためにローカルクライアントデバイスにより使われる場合がある。

【誤訳訂正４】
【訂正対象書類名】明細書
【訂正対象項目名】００２８
【訂正方法】変更
【訂正の内容】
【００２８】

図８は、ネットワークで送信側のサーバデバイス１４、受信側のサーバデバイス１４、そしてクライアントデバイス１２を含むオーディオ/ビデオ(A/V)モデルの例を示す。前記送信側のサーバデバイス１４は送信側のサーバデバイス１４のデータストリーム送信側ハードウェア３２を制御するための制御プログラム２０を含み、前記受信側のサーバデバイス１４は受信側のサーバデバイス１４のデータストリーム受信側ハードウェア３４を制御するための制御プログラム２０を含む。例示的な動作で、使用者はデータストリーム送信側ハードウェア３２を稼動させるために送信側のサーバデバイス１４を制御し、データストリーム受信側ハードウェア３４を稼動させるために受信側のサーバデバイス１４を制御するクライアントデバイス１２を使用する。データストリーム送信側ハードウェア３２からデータストリーム受信側ハードウェア３４へのデータ伝送を初期化することにおいて、使用者はこれ以上前記クライアントデバイス１２を操作する必要がない。他の一方では、使用者は将来の初期データ伝送をプログラムでき、これ以上クライアントデバイス１２を操作する必要がない。以後で送信側のサーバデバイス１４のデータストリーム送信側ハードウェア３２と受信側のサーバデバイス１４のデータストリーム受信側ハードウェア３４は使用者によりプログラムされた時間に自動でデータ伝送を初期化する。

【誤訳訂正５】
【訂正対象書類名】明細書
【訂正対象項目名】００２９
【訂正方法】変更
【訂正の内容】
【００２９】

例えば、前記データストリーム送信側ハードウェア３２は、衛星放送(DBS: Direct Broadcast Satellite)のようなチューナーアクセスデバイスを含むことができる。DBSはケーブルテレビに代える多重一チャンネルであって、衛星から直接的に小さな衛星アンテナ(直径３フィート１８インチ)にケーブルのようなテレビプログラミングを提供する。DBSと共に、いくつかの標準アナログテレビ信号は単一衛星トランスポンダでデジタル的に圧縮され、空中の指定された場所に位置した衛星アンテナも２００つ以上のチャンネルが受信することを許容する。前記データストリーム受信側ハードウェア３４は、再生時に圧縮されたデジタルビデオ信号をデコーディングできる命令及びデジタルビデオカセットレコーダ(DVCR)を含むことができる。使用者はDVCRのための”時間－遅延録画”イベントデータとチューナーアクセスデバイスのための”時間－遅延選択プログラム”イベントデータを含む命令及び制御データを提供する。時間遅延後に前記チューナーアクセスデバイスは希望のプログラムを選択し、使用者から追加的な制御操作なしでもプログラムデータを受信及び録画するDVCRにソースプログラムデータを提供する。

【誤訳訂正６】
【訂正対象書類名】明細書
【訂正対象項目名】００３０
【訂正方法】変更
【訂正の内容】
【００３０】
図９は、少なくともネットワークで送信側のサーバデバイス１４　SERVER１、受信側のサーバデバイス１４　SERVER２とクライアントデバイス１２を含むさらに他のA/Vモデルを示す図面である。前記クライアントデバイス１２は、サーバデバイス１４　SERVER１及びSERVER２と他のサーバデバイス１４、例えばSERVER３及びSERVER４（図示せず）を選択し制御するために、使用者のための選択情報をディスプレイする使用者インタフェースのあるセッションマネージャ３６を含む。選択情報はサーバデバイス１４　SERVER１、SERVER２、SERVER３及びSERVER４を各々選択する使用者のためにセッションマネージャ３６でServ１、Serv２、Serv３及びServ４に割当てられたアイコンシンボルを含む。前記送信側のサーバデバイス１４　SERVER１はDVCRを含むことができ、前記受信側のサーバデバイス１４　SERVER２は１/２DTVを含むことができる。
【誤訳訂正７】
【訂正対象書類名】明細書
【訂正対象項目名】００３１
【訂正方法】変更
【訂正の内容】
【００３１】
動作の一例として、サーバデバイス１４　SERVER１とSERVER２の選択において、前記クライアントデバイス１２は各サーバデバイス１４のGC０２２をクライアントデバイスに伝送し各サーバデバイス１４　SERVER１及びSERVER２に対応するGUI１８をディスプレイする。使用者は、サービスのために対応するサーバデバイス１４に制御と命令を提供する各サーバデバイス１４のGUI１８と相互作用できる。各サーバデバイス１４は単独または他のサーバデバイス１４と組合してサービスを提供できる。さらに、前記セッションマネージャ３６は、サービスを行うために対応するサーバデバイス１４が必要とするものであって、前記クライアントデバイス１２で前記サーバデバイス１４のGUI１８間に制御状態データ２６を伝送する。使用者制御と命令情報に基づいて、二つ以上のサーバデバイス１４は使用者が求めるサービスを提供するためにそれら間で命令及び制御情報を通信できる。
【誤訳訂正８】
【訂正対象書類名】明細書
【訂正対象項目名】００３２
【訂正方法】変更
【訂正の内容】
【００３２】
前記セッションマネージャ３６は、ネットワーク１０で多様なサーバデバイス１４により提供される有用なホームネットワークサービスをアクセスしディスプレイする機能を有するソフトウェアエージェントを含むことができる。前記ソフトウェアエージェントは付加的にネットワーク１０で多様なサーバデバイス１４の性能を整合させ、互換性能を有する前記サーバデバイス１４だけのための選択情報をディスプレイする。さらに、セッションマネージャ３６は、使用者がサーバデバイス１４に意味のある命令及び制御情報を提供するように一つのサーバデバイス１４のGUI１８で作られた選択と、他のサーバデバイス１８のGUI１８で作られた選択を整合させられる。
【誤訳訂正９】
【訂正対象書類名】明細書
【訂正対象項目名】００３３
【訂正方法】変更

【訂正の内容】
【００３３】
動作のさらに他の例で、セッションマネージャ３６はネットワークを検索し、ネットワークに接続されたサーバデバイス１４を見つけるソフトウェアエージェントを実行する。前記ソフトウェアエージェントは、またサーバデバイス１４の性能を決定するために各サーバデバイス１４に貯蔵された性能データをアクセスし、使用者にその性能に対する情報を提供する。それから前記セッションマネージャ３６は、図９に示したようにサーバデバイスSERVER１、SERVER２、SERVER３及びSERVER４のための選択アイコンServ１、Serv２、Serv３及びServ４をディスプレイする。
【誤訳訂正１０】
【訂正対象書類名】明細書
【訂正対象項目名】００３４
【訂正方法】変更
【訂正の内容】
【００３４】
前記セッションマネージャ３６は、使用者が４個の全てのアイコン中で選択できるように初期に全ての選択アイコンServ１、Serv２、Serv３及びServ４をイネーブルさせる。使用者がServ１選択アイコン上でクリックしてサーバデバイスSERVER１を選択した後に、前記セッションマネージャ３６はサーバデバイスSERVER３及びSERVER４がサーバデバイスSERVER１と性能上互換できないと決定する。従って、前記セッションマネージャ３６はサーバデバイスSERVER３及びSERVER４のために選択アイコンServ３及びServ４を各々ディスエーブルさせる。それから使用者はサーバデバイスSERVER２を命令及び制御するためにアイコンServ２上でクリックできる。
【誤訳訂正１１】
【訂正対象書類名】明細書
【訂正対象項目名】００３５
【訂正方法】変更
【訂正の内容】
【００３５】
使用者が選択されたサーバデバイス１４のGUI１８と相互作用することのように、使用者により各GUI１８に入力された制御及び命令情報は使用者により後続するサーバデバイス選択に影響を及ぼす付加的な性能情報を提供する。例えば、もしVCRサーバデバイス１４が選択されれば、他のサーバデバイス１４のための選択アイコンをイネーブルまたはディスエーブルさせることにおいて、セッションマネージャ３６による後続の操作が再生または録画する使用者の決定により影響される。
【誤訳訂正１２】
【訂正対象書類名】明細書
【訂正対象項目名】００３７
【訂正方法】変更
【訂正の内容】
【００３７】
各サーバデバイス１４はネットワーク上でいろいろな他のサービスのために送信または受信するので、図１０に示したように各サーバデバイス１４は性能データテーブル(性能テーブル１)を貯蔵する。テーブル１の第１列はサーバデバイス１４のサービス性能を確認し、第２列は第１列に対応するサービスのために前記サーバデバイス１４が送信側か受信側かを確認する。新たなサービスはさらに古いデバイスと互換性を維持する間に性能データテーブル１を使用して実行される。例えば、もしさらに古いサービスと互換される新たなサービスが開発されるならば、新たなサービス及び古いサービス両方とも実行デバイスは古いサービスを使用する古いデバイスと互換性を維持するにつれて、前記新たなサービスを行うデバイスのための性能データテーブル１に書き込まれることができる。

【誤訳訂正１３】
【訂正対象書類名】明細書
【訂正対象項目名】００３８
【訂正方法】変更
【訂正の内容】
【００３８】
第１実施形態で、デバイスマネージャは送信側及び受信側のサービスデバイスのマッチングまたは比較を行う。例えば、前記デバイスマネージャは互換性マッチングと共に多様なサーバデバイス１４及び指定されたサーバデバイス１４の性能及び特性を比較するソフトウェアエージェントの役割も行える。例えば、サービスがネットワークにわたって第１サーバデバイス１４から第２サーバデバイス１４までメディアストリームの場合、前記デバイスマネージャは使用者が第１サーバデバイス１４の性能と互換される第２サーバデバイス１４を分別力あるように選択できるように第１及び第２サーバデバイス１４の性能を比較する。次はサーバデバイス１４の実施形態のためのサービス性能リストの例を示す。

Stream_format_video_dv
Stream_format_video_mpeg2tpt
Stream_format_video_dsstpt
Stream_format_video_mpeg2pes
Stream_format_video_mpeg210901-tpt

【誤訳訂正１４】
【訂正対象書類名】明細書
【訂正対象項目名】００３９
【訂正方法】変更
【訂正の内容】
【００３９】
図１１に示したように、各サーバデバイス１４はデバイスに関した特性を含む特性データテーブル(特性テーブル２)をさらに貯蔵する。名称と値はテーブル２で各特性を定義する。文字長さがテーブル２に示されているが、必要ではない。前記特性データはネットワーク１０上で情報処理相互運用を容易にしデバイス情報を貯蔵する他のサーバデバイス１４に有用である。例えば、後述されるようにデバイスページはデバイス名称を貯蔵する特性テーブル２を使用する。他のフィールドは必要な時特性データテーブル２に追加されることができる。
【誤訳訂正１５】
【訂正対象書類名】明細書
【訂正対象項目名】００４１
【訂正方法】変更
【訂正の内容】
【００４１】
特性テーブル２で前記デバイス位置特性フィールドは各サーバデバイス１４のための位置またはグループを貯蔵するために使われる。デバイスタイプ特性フィールドはVCR、DVD、DTV、カムコーダ、PC、保安システムのような特定のサーバデバイス１４のためのデバイスタイプを書き込む。前記デバイスタイプ特性フィールドは、もしデバイス自体がデバイスアイコンを供給しないならば、デバイスページでデバイスを表現するデフォルトデバイスアイコンを選択するために使われる。特性テーブル２はデフォルトソース及びデフォルトシンク特性フィールドのための多重の書き込みを含むことができる。そのようなそれぞれの書き込みは、サーバデバイス１４により処理される各データタイプのための他のデフォルトの送信側または受信側のサーバデバイス１４を表現する。
【誤訳訂正１６】
【訂正対象書類名】明細書
【訂正対象項目名】００４５

【訂正方法】削除
【訂正の内容】
【誤訳訂正１７】
【訂正対象書類名】明細書
【訂正対象項目名】００４６
【訂正方法】削除
【訂正の内容】
【誤訳訂正１８】
【訂正対象書類名】明細書
【訂正対象項目名】００４７
【訂正方法】削除
【訂正の内容】
【誤訳訂正１９】
【訂正対象書類名】明細書
【訂正対象項目名】００４９
【訂正方法】変更
【訂正の内容】
【００４９】
第２実施形態”Ｂ”で、使用者はソフトウェアクライアント制御プログラム５０により置き換えられる。前記ソフトウェアクライアント制御プログラム５０はXML基盤のサービスアプリケーション”Ｓ”への命令ポスティングを生成し、返信されるXML命令ポスティングを受信する。そして、第３実施形態”Ｃ”で、前記ソフトウェアクライアント制御プログラム５０は、命令と応答が二つのサービスアプリケーション２０間で交換されるサーバデバイス制御プログラム２０のようなアプリケーションにより置き換えられる。この点において、実施形態”Ｂ”はナル(Null)サービスを有する実施形態”Ｃ”の特別な場合である。
【誤訳訂正２０】
【訂正対象書類名】明細書
【訂正対象項目名】００５２
【訂正方法】変更
【訂正の内容】
【００５２】
サービスAのためのAPI拡張を参照すれば、第１最上位ブロック５２は、CEデバイスを説明する英単語を使用してCE対象及び方法の総合的な定義またはデータベースを提供する。前記総合的な定義またはデータベースはC、XMLまたは対象及びそれら各自の方法を表現できる他のフォーマットでも存在できる.XMLを使用する総合的な定義またはデータベースはXCF定義と呼ばれる。第２ブロック５４は、インタフェースデータタイプ定義INTERFACE.DTDでデザインされた全てのサーバデバイス１４のためにXML形式でAPIを表現するフォーマットを提供する。
【誤訳訂正２１】
【訂正対象書類名】明細書
【訂正対象項目名】００６４
【訂正方法】変更
【訂正の内容】
【００６４】
図１７を参照すれば、制御器サーバデバイス１４及び制御されたサーバデバイス１４間のデバイス－デバイスまたは内部デバイスを制御する他の例が示される。前記制御器サーバデバイス１４は制御器アプリケーションを含み、制御されたサーバデバイス１４は実行可能なアプリケーションCを含む。制御されたサーバデバイス１４はINTERFACE-A.XML、アプリケーションCのアプリケーションインタフェース説明をさらに含む。アプリケーショ

ンEは、制御されたサーバデバイス１４の性能及び制御されたサーバデバイス１４のAPIインタフェース方法を問い合わせるために制御されたサーバデバイス１４内のアプリケーションインタフェース説明Aをアクセスする。次に、アプリケーションEは、制御されたサーバデバイス１４のハードウェアまたはサービスDを制御するためにXML遠隔手順呼び出しを使用してアプリケーションCを命令し制御する。スケジューラデバイスはVCRの時間ー遅延ー録画制御器のように定められた日になれば駆動する制御器サーバデバイス１４の一場合でありうる。

【誤訳訂正２２】
【訂正対象書類名】明細書
【訂正対象項目名】００６５
【訂正方法】変更
【訂正の内容】
【００６５】
第１例で、前記アプリケーションEは、ネットワークを通じた遠隔照会によりアプリケーションインタフェース説明Aをアクセスする。第２例で、前記アプリケーションEは、制御されたサーバデバイス１４から制御器サーバデバイス１４にアプリケーションインタフェース説明Aのコピーを伝送することによってアプリケーションインタフェース説明Aをアクセスする。次に、アプリケーションEは局部的にインタフェース説明Aに問い合わせる。第３例で、アプリケーションインタフェース説明Aはインタフェース説明のためにライブラリ空間を提供するライブラリデバイス６４に伝送され、アプリケーションEはライブラリでインタフェース説明Aを遠隔で問い合わせる。前記ライブラリデバイス６４は直接的な制御動作及び応答を使用できる関連したアプリケーションのアドレス(URL)を貯蔵する。

【誤訳訂正２３】
【訂正対象書類名】明細書
【訂正対象項目名】００６６
【訂正方法】変更
【訂正の内容】
【００６６】
図１８を参照すれば、XMLプロトコルはネットワークで多様なサーバデバイス１４のアプリケーション２０間のAPIレベルで通信スタック６６においてウェブ標準共通ミドルウェア階層を提供する。各サーバデバイス１４で通信スタックの最上部アプリケーションはネットワークを通じて通信メッセージを送受信し、デバイスのためのデバイスハードウェアまたはサービスソフトウェアを局部的に制御するデバイススタックでソフトウェア階層と通信する。

【誤訳訂正２４】
【訂正対象書類名】明細書
【訂正対象項目名】００６９
【訂正方法】変更
【訂正の内容】
【００６９】
それぞれのサーバデバイスA及びBはネットワークを通じて他のサーバデバイスを制御し、ネットワークを通じて他のサーバデバイスにより制御されるためのハードウェアとソフトウェアを含む。図１９で、ホームネットワークデバイスAは制御器デバイスまたはモジュールであり、ホームネットワークデバイスBは制御されたデバイスまたはモジュールである。それぞれのデバイスA及びBは、インタフェース文書INTERFACE.XML及び文書タイプ定義INTERFACE.DTDで構成された局部的なデバイスXMLインタフェース７２を含む。INTERFACE.XML文書は対応するサーバデバイス１４により支援される対象、方法及びパラメータの説明を含む。前記INTERFACE.DTD文書は、前述されたようにデバイスのXMLインタフェースで具体的な正当性チェックのために使われたりする。

【誤訳訂正２５】
【訂正対象書類名】明細書
【訂正対象項目名】００７１
【訂正方法】変更
【訂正の内容】
【００７１】
プログラムコードで構成されたインタフェースフェッチャ(Fetcher)は、さらに他のデバイスまたはホームネットワークインタフェースライブラリ８０から直接的にさらに他のデバイスのデバイスインタフェースをフェッチするためにそれぞれのデバイスAおよびBにより使われる。サーバデバイス１４が制御器デバイスであれば、制御器サーバデバイス１４内の制御器アプリケーションプログラムコード８２は、XMLパーサ７４、インタフェースフェッチャ７８およびXMLRPCコーデック７６のような制御器サーバデバイス１４内のソフトウェアおよびハードウェアを統制することによって、ネットワークを通じて他のサーバデバイス１４の命令および制御に影響を与える。サーバデバイス１４が制御されたデバイスであれば、制御されたサーバデバイス１４内の制御されたアプリケーションプログラムコード８４は他のサーバデバイス１４により制御されるサーバデバイス１４のためにサーバデバイス１４内のソフトウェアおよびハードウェアを統制する。それぞれのデバイスAおよびB内のホームネットワークデバイスウェブサーバ８６はネットワーク上のデバイス間の通信を管理する。各デバイスA及びB内の固有ルックアップテーブル８８に対するXMLはX、MLRPCメッセージ(例えば方法名称、構成要素名称及びタイプ)をデバイスの固有インタフェース(例えば固有方法名称、構成要素及びタイプ)に変換する制御されたアプリケーション８４により使われる。前記テーブル８８は、XMLメッセージ内で方法及びパラメータの名称とデバイスの固有インタフェースが同じ場合には使われない。
【誤訳訂正２６】
【訂正対象書類名】明細書
【訂正対象項目名】００７３
【訂正方法】変更
【訂正の内容】
【００７３】
さらに、ホームネットワーク対象要請ブローカ(HNORB: Home Network Object Request Broker)７９及びインタフェースライブラリ(IL: Interface Library)のようなネットワーク対象要請ブローカはホームネットワーク１０のためのミドルウェア階層９８を提供する。図１９に示したように、前記ミドルウェア階層９８は第３デバイス９６または分離された制御ハブに位置できる。前記HNORB７９は、ネットワーク１０に接続された他のサーバデバイス１４の存在を見つける一つのサーバデバイス１４により使われるためのソフトウェアエージェントを含む。前記HNORBソフトウェアエージェントはデバイス名称を名称の階層的なツリー構造で組織し、デバイスインタフェースを前記検索できるインタフェースライブラリで組織し、そしてインタフェース情報を要請するデバイスにデバイスインタフェースを提供する。
【誤訳訂正２７】
【訂正対象書類名】明細書
【訂正対象項目名】００７５
【訂正方法】変更
【訂正の内容】
【００７５】
前記インタフェースライブラリ８０を使用するために、少なくとも一つのHNORB&ILは局部的なホームネットワーク１０上で動作中であるべきである。一つ以上のHNORB&ILがまた利用される。例えば、ケーブルモデム、いくつかのDTV、そして中央家庭ハブは全てそれら自体のHNORB&ILソフトウェアエージェントを有することができる。HNORB&ILの位置を定めるためにサーバデバイス１４は局部的なホームネットワークを通じて放送メッセージを

伝送する。サーバデバイス１４で応答した第１HNORB&ILはサーバデバイス１４により使われる。一応HNORB&ILが位置すれば、サーバデバイス１４及びHNORB&ILは登録、インタフェース要請及びフェッチのための地点間TCP(Transmission Control Protocol)またはUDP(User Datagram Protocol)とデバイスルックアップサービスを確認できる。もしUDPプロトコルを利用できなければ、TCPプロトコルがIEEE１３９４のような高帯域幅接続のために使われる。HTTP－基盤のXMLRPCはHNORB&IL通信のためのデバイスのために使われる。例えば、サーバデバイス１４は一つ以上の構成要素としてデバイスインタフェースをパスするためにHNORBの”レジスター”方法を遠隔で呼び出すことができ、またはXMLRPC呼び出しはXMLRPC応答または戻る値としてILから部分的または全体的なデバイスインタフェースを再生できる。

【誤訳訂正２８】
【訂正対象書類名】明細書
【訂正対象項目名】００７６
【訂正方法】変更
【訂正の内容】
【００７６】

前述したように、一つ以上のHNORB&ILは同時に局部的なホームネットワーク１０で動作でき、ここで各HNORB&ILは使用可能なデバイスのサブセットを認識でき、一つのHNORB&ILは見つけられないサーバデバイス１４を位置させるために他のHNORB&ILと通信できる。一つの局部的なホームネットワーク１０上の多重HNORB&ILは、UDP及びTCPのような放送メッセージを使用することによって自動で相互間に位置できる。このような場合に、多重HNORB&ILは多数のインタフェースライブラリ８０が分散インタフェースライブラリを構成する問分散対象要請ブローカを構成する。故障許容誤差を提供するために、もし一つのHNORB&ILが突然終らなければならないならば、このHNORB&ILと共に登録された全てのデバイスは通知され、前記デバイスは他の有用なHNORB&ILと共に自動で登録される。

【誤訳訂正２９】
【訂正対象書類名】明細書
【訂正対象項目名】００８２
【訂正方法】変更
【訂正の内容】
【００８２】

望ましくは、全てのデバイスがネットワークを通じてRPC呼び出しを説明しデコーディングできるように、標準XMLRPCフォーマットが使われる。制御されたサーバデバイス１４のデバイスインタフェースが制御器サーバデバイス１４により問い合わせられ調査されるために、望ましくは能率を向上させるために充分なデバイスインタフェース情報を有する単純化されたXMLRPCフォーマットが使われる。次の例はOTR(One Touch Record)及びTDR(Time Delayed Record)動作のためにXMLRPCを呼び出す二つの可能なフォーマットを示す。

【誤訳訂正３０】
【訂正対象書類名】明細書
【訂正対象項目名】００８５
【訂正方法】変更
【訂正の内容】
【００８５】

図２０を参照すれば、ホームデバイスであるサーバデバイス１４のためのデバイスインタフェースは、標準化された用語を使用する産業標準の構造化されたデータベース１００に基づく。新たなインタフェースのためのインタフェースデータ及び用語はデータベース１００に追加される。CE対象を説明するために英単語を使用する包括的な定義あるいはデータベース、方法そしてパラメータはCEデータベース１０２に規定される。包括的な定義またはデータベースは対象及びそれらそれぞれの方法及び構成要素を示すC、XMLまたは他のフォーマットになりうる。標準化されたXML用語を使用する包括的な定義またはデータ

ベースはXCE定義またはデータベース１０４と呼ばれる。
【誤訳訂正３１】
【訂正対象書類名】明細書
【訂正対象項目名】００８７
【訂正方法】変更
【訂正の内容】
【００８７】
図２０で、埋め込まれた装置１４のために'製造会社'情報としてデザインされた情報は製造時装置１４に内蔵されたものであり、'ホームネットワーク'としてデザインされた情報はネットワークで装置の動作的実行時間特徴の一部である。Nデバイスのための１....Nとしてデザインされたデバイス XMLインタフェース７２は、標準化されたXCEデータベース１０４でデータの一部分である。ホームネットワークインタフェースライブラリ(HNIL: Home Network Interface Library)１０６はホームネットワークに接続された使用可能なサーバデバイス１４のデバイスインタフェース集合を提供する。HNIL １０６は全体XCEデータベース１０４のサブセットである。
【誤訳訂正３２】
【訂正対象書類名】明細書
【訂正対象項目名】００８９
【訂正方法】変更
【訂正の内容】
【００８９】
図２０を参照すれば、前記XCEデータベース１０４は、またCEサーバデバイス１４を表現するXMLを使用するために標準化された規定セットを提供するCEデバイスのための標準化されたXCEインタフェース文書タイプ定義(DTD: Document Type Definition)を提供する。前記DTDまたはそのサブセットは正当性チェックのために使われる。製造会社手段１０８としてデザインされたソフトウェアエージェントは、規定されたCEデバイスのための標準化されたXCE定義のサブセットをフィルタリングして使用するが、例えばINTERFACE.XML及びINTERFACE.DTDのようなCEデバイスのXMLデバイスインタフェース７２を生成する標準化されたXCEインタフェースDTDを使用する。前記文書INTERFACE.XMLは標準化されたXCEインタフェースDTDに従って特殊なデバイスにより支援される対象、方法及びパラメータの説明を含む。前記文書INTERFACE.DTDは標準化されたXCEインタフェースDTDのサブセットであって、デバイスのXMLインタフェースのための正当性チェックのために使われる。他の文書タイプ定義もINTERFACE.XML文書を生成するために使われたりする。
【誤訳訂正３３】
【訂正対象書類名】明細書
【訂正対象項目名】００９０
【訂正方法】変更
【訂正の内容】
【００９０】
前記XMLインタフェース文書及び前記DTD文書を含むCEデバイスのXMLインタフェース７２は、ホームネットワークインタフェースライブラリ１０６のような一般的にアクセスできるライブラリに貯蔵される。ソフトウェアエージェント１１０はネットワーク上の全てのアクセスできるサーバデバイス１４のデバイスインタフェース７２を収集し、デバイス名称/アドレス情報と共に検索できる構造化されたインタフェースライブラリ１０６にそれらを配置する。前記インタフェースライブラリ１０６はXCEデータベース１０４のサブセットであって、インタフェースライブラリ１０６を作る過程は部分または全てのXCEデータベース１０４を再構成することと類似である。前記インタフェースライブラリ１０６は、ホームネットワーク内の全てのデバイスのデバイスインタフェースの集合または最も最近に使われたデバイスインタフェース７２が貯蔵されるホームネットワークで全てのサーバデバイス１４の有用性に依存するキャッシュ(Cache)として機能できる。サーバデバ

イス１４が、DVD再生器でディスクを変えることのようなイベントに起因してそのデバイスインタフェース７２を更新した場合には、デバイスインタフェース７２の一部がイベントサービスに基づいて更新される。

【誤訳訂正３４】
【訂正対象書類名】明細書
【訂正対象項目名】００９１
【訂正方法】変更
【訂正の内容】
【００９１】

図２１を参照すれば、望ましくは各サーバデバイス１４のデバイスインタフェース定義７２は階層的な形態を有する。なぜならこれはホームデバイスにおいて、デバイスインタフェース定義７２が長くなる可能性があるからである。典型的に、時間遅延された録画のための単一機能のような一つまたは少数の機能は同時にアクセスされ、従って前記デバイスインタフェース７２の唯一に小さな部分が使われる。全体デバイスインタフェース７２を作成することよりはデバイスインタフェース７２の一部分だけを作成することがより効果的である。階層的なデバイスXMLインタフェースを使用することによって、制御器サーバデバイス１４は、制御器サーバデバイス１４またはHNORB及びILミドルウェア階層９８からXMLデバイスインタフェースのための要求において望ましい機能カテゴリーまたは機能を特定することによって、制御されたサーバデバイス１４の部分的なデバイスインタフェース７２を求められる。後者の場合に、HNORB及びILミドルウェア階層９８はデバイスインタフェース７２の望ましい部分を回送する。

【誤訳訂正３５】
【訂正対象書類名】明細書
【訂正対象項目名】００９４
【訂正方法】変更
【訂正の内容】
【００９４】

本発明に係る他のサーバデバイス１４を制御するサーバデバイス１４のための典型的な命令及び制御モデルで、第１サーバデバイス１４は第２インタフェース階層１１４で第２サーバデバイス１４のデバイスインタフェースを問い合わせるように試みる。機能カテゴリー(FC: Function Category)を選択した後、前記第１サーバデバイス１４は、録画カテゴリーのような第２サーバデバイス１４で特定の機能カテゴリーのインタフェース階層１１６を問い合わせる。さらに、前記第１サーバデバイス１４は前記機能に対する呼び出しを作るためにOTRまたはTDRのように特定の機能をインタフェース階層１１８に問い合わせる。階層的またはツリー構造はより効果的なインタフェース機能を探すようにしてネットワーク帯域幅を縮める。インタフェースファイル構造及び層の例が下記の通りである。

第１層１１２－HN1.xmlXML
第２層１１４－VCR1.xml
第３層１１６－VCR1_RecordCategory.xml
第４層１１８－VCR1_RecordCategory_OTR.xml

【誤訳訂正３６】
【訂正対象書類名】明細書
【訂正対象項目名】００９７
【訂正方法】変更
【訂正の内容】
【００９７】

前記階層的なデバイスインタフェース定義７２は次のような分野を含む。

'document file'、これはXCEデータベース１０４またはXCEデータベース１０４のバージョン部分の正当性及び訂正の検証のためにXMLパーサにより使われる文書タイプの規定(DTD)ファイルの名称を提供する。前記XCE構造の相異なる部分のためのいろいろなDTD

ファイルが考えられ、ここで前記DTDはRPC.CALLのための文書タイプ定義及び通信のためのINTERFACE.DTDとは違う。

'doc'、これは互換性、特性、通信及び制御インタフェースの領域の最上位レベル名称を提供する。

'Services_home'、これは家庭自動化、電化製品、効用性のための領域を提供する。

'Server_auto'、これは車庫内にある自動車に対して、一台またはそれ以上の自動車タイプに対する有用なメッセージインタフェースを示す。例えば、'server_auto_ford_explorer_98'は特定自動車に対するインタフェースである。これは自動車のマイレージ及び保守インタフェースをアクセスできるようにし、直接チェックする自動車製造会社または車庫が直接チェックまたは遠隔診断する遠隔アクセスで使われる。

'server_samsung_web_site'、これは家庭外部の製造会社ウェブサイトと通信し、メッセージ、サービス、アシストなどのためのインタフェースを含む。

'AVC_commands'及び'CAL_commands'、これは例えばAV/C及びCAL言語を解釈できるレガシーデバイスを提供する。この構造部分は前記言語で命令を確認し、命令はXMLで付加されたり行われる。従って、前記項目はXCE(Web)対象ではなく、プロトコル変換器アプリケーションは元のCALまたはAV/Cアプリケーションソフトウェアへのインタフェースとして使われる。

【誤訳訂正３７】
【訂正対象書類名】明細書
【訂正対象項目名】０１００
【訂正方法】変更
【訂正の内容】
【０１００】

前述した内容を参照すれば、'service_id'または'application_interface_id'は名称、アドレスまたはウェブアドレス、または一つ以上のデバイスのURL位置を含む。XCEデータベース１０４はインタフェースに対して合意された全体を構成するために、通常DHCP(Dynamic Host Configuration Protocol)ソフトウェアエージェントは各デバイスにアドレス及びデフォルト名称を割り当て、前記アドレス及びデフォルト名称はサービスまたはデバイスのインタフェースに追加される。それから、ソフトウェアエージェント１１０は'部分的なXCEネットワーク(Network partial XCE)'を生成するために、ホームネットワークに局部的に接続された全てのデバイスからサブセットまたは'部分的なXCEデバイス(Device partial XCE)'を含むデバイスインタフェース７２を集める。付加的な関連外部インタフェースが外部制御のための構造に追加される。例えば、'service_id'は、ネットワークに接続されたデバイスのデバイスインタフェースによってソフトウェアエージェントから加入を含む受信された構造またはネットワークインタフェースライブラリ１０６内の名称/アドレスでありうる。その後、使用者はデータベースでサービスを検索でき、前記名称/アドレスを使用してライブラリの特定のデータ部分を含むアプリケーションをアクセスできる。従って、ネットワークは前記名称/アドレス情報により識別された多重の同じサービスを含むことができる。

'media'、これは例えば、チューナからの伝送ストリーム、PC DRAMからRAM、DCまたはDVDのためのディスク及びテープを含むメディアタイプのためのインタフェースを提供する。前記メディアは命名され確認され、制御器デバイスはネットワーク上で提供される一般のメディアを確認するXCEデータベースを検索できる。DVDディスクのような新たなメディアがネットワーク上で提供される時、ディスク上でプログラム資料を確認するデバイスインタフェース７２の一部が適合に変換される。従って、全体デバイスインタフェース７２が伝送される必要はなく、ただ適した部分がXCEデータベースに伝送される。アテンション信号の受信でライブラリソフトウェアエージェント１１０は新たな更新をフェッチでき、適した場所にそれを位置させられる。ディスクメディアの付加は、前記ネットワークにサービスを追加したりまたは前記ネットワークに他の装置を接続することと類似である。

‘rate’、これは例えば、６Mbits/Secまたは１９．２Mbits/Secのようにデバイスインタフェースのためのデータストリームレートに対する値を提供する。

‘protocol’、これは前記データストリームのために使われたプロトコルを確認する。例えば、６１８８３/１３９４またはUIC/IPのように、一つ以上のプロトコルが提供されれば、望ましいプロトコルが選択される。

‘stream_format’、これはデジタルストリームオーディオ及びビデオ分割のためのパケットフォーマット及び/または圧縮標準を提供する。もし一つ以上のフォーマットが提供されれば、望ましいフォーマットがインタフェースメッセージを通じて選択される。制御器アプリケーション８２は互換的なフォーマットがあるかどうかを決定できるフォーマットを調べられる。

‘controls_av’、これはA/Vメディア装置のためのメーン制御インタフェースを提供する。

‘Flow_control’、これは特定のデバイスのための方法であってPLAY、STOP、GOTO、RECORDのようなデータストリーム制御を提供する。その方法は、例えばPCソフトウェアを除いては埋め込まれた(Embedded)装置に対して変わらない。tkdrl制御は遅延された動作のために時間構成要素を含むことができる。

‘Tuning’、これはチューニング制御のためのインタフェースを提供する。制御器サーバデバイス１４は、制御されたサーバデバイス１４のインタフェースに前述された電子プログラムガイド(EPG: Electronic Program Guide)データ構造の返信を求められる。

‘UIcontrol’、これはディスプレイに対する輝度及びコントラスト、オーディオに対するボリューム及びベースのような修正を制御するために制御されたアプリケーション８４に制御インタフェースを提供する。

‘Timer_record’、これは遅延された時間記録を具現するために制御器アプリケーション８２に対してセットーアップデータのためのインタフェースを提供する。直接的なチャンネル同調情報及びフロー制御(time_aparams)情報が使われたりする。

【誤訳訂正３８】
【訂正対象書類名】明細書
【訂正対象項目名】０１０２
【訂正方法】変更
【訂正の内容】
【０１０２】

他の観点で、本発明はネットワークでデバイスーデバイス命令及び制御のために存在する命令語具現の使用を提供する。デバイスは、内部対象及び存在する伝送メカニズムによって、実行時に２進数列を生成するAPIを有する。このような場合、ネットワークで一つのサーバデバイス１４からさらに他のサーバデバイス１４にXML遠隔手順呼び出し(XMLRPC: XML Remote Procedure Calls)を提供するために、存在するアプリケーションインタフェース具現はXMLサービスAPIに対する呼び出しに取り替えられる。従って、本来の具現はXMLサービスAPIのためのラッパ(Wrapper)と同等である。図１８は、またXCE/XMLサービスAPIでラッパに取り替えられたインタフェース具現として、点線内のCALまたはAV/Cのような他の命令語を使用して生成されたアプリケーションを示す。CAL命令語からXMLRPCフォーマットを変える例が下に示されている。

```
existing implementation:
void DeviceCALCommand(int command){
            ×
            ×
            /*
            create CAL formatted byte string to represent this
            object/method and output to the wire
            */
```

```
            CreateCALFormattedByteString(command);/* different for
                                                every protocol*/
            SendCALByteString(); */different for every protocol
*/
}
-----------------------------------------------------------------
wrapping the XML Service API call:
void DeviceCALCommand(int command){
{
            /*
            replace CAL implementation with calls to the XML
ServiceAPI
            */
            CreateXMLMessage(command); /* always the same */
            sendXMLMessage(); /* always the same */
}
```

【誤訳訂正３９】
【訂正対象書類名】明細書
【訂正対象項目名】図面の簡単な説明
【訂正方法】変更
【訂正の内容】
【図面の簡単な説明】
【図１】　本発明の第１観点に係るネットワークの具現のためのブロック図である。
【図２】　デバイス制御及び通信概要の第１実施形態に係る図１のブロック図である。
【図３】　多数のクライアントとサーバデバイスを含む本発明に係るホームネットワークシステムに対する第１実施形態を示すブロック図である。
【図４】　図３のクライアントデバイス及びサーバデバイス具現の第１実施形態を示すブロック図である。
【図５】　クライアントデバイス具現の第１実施形態を示す図面である。
【図６】　サーバデバイス具現の第１実施形態を示す図面である。
【図７】　相互間に通信及び制御を可能にするネットワークサーバデバイスの第２実施形態を示すブロック図である。
【図８】　ネットワークで送信側のサーバデバイス、受信側のサーバデバイス及びクライアントデバイスを含むオーディオ/ビデオモデルの構造に対する第１実施形態を示すブロック図である。
【図９】　オーディオ/ビデオモデルの他の実施形態を示す図面である。
【図１０】　ネットワークデバイスのための性能データテーブルの実施形態を示す図面である。
【図１１】　図１１は、ネットワークデバイスのための特性データテーブルの実施形態を示す図面である。
【図１２】　ネットワークデバイス間で命令メッセージを発生させるビルディングブロックに対する第１実施形態の構成を示す図面である。
【図１３】　命令メッセージを発生させる図１２に係るビルディングブロックの他の実施形態の構成を示す図面である。
【図１４】　ネットワーククライアント及びサーバデバイス間で相互作用の第３実施形態を示す図面である。
【図１５】　ネットワークデバイスインタフェースのAPI拡張を定義する第１実施形態のブロック図である。
【図１６】　他のサーバデバイスのインタフェース説明文書をアクセスするサーバデ

バイスアプリケーションのための第１実施形態の構造を示す図面である。

【図１７】　制御器サーバデバイスと制御されたサーバデバイスとの間の内部－デバイス制御構造の他の実施形態を示す図面である。

【図１８】　ネットワークデバイス間のAPIレベルで通信スタックでウェブ標準共通ミドルウェア階層を提供するXMLプロトコルの具現を示す図面である。

【図１９】　サーバデバイス間命令制御構造のまた他の具現を示す図面である。

【図２０】　デバイスインタフェースライブラリとホームデバイスのための電化製品データベースとの関係を示す図面である。

【図２１】　デバイスインタフェース定義に対する階層的形態の具現を示す図面である。

【図２２】　図２１のデバイスインタフェース定義で階層の第１実施形態を示す図面である。

【図２３】　伝送器及び受信器デバイス間で共通伝送及び解釈手順を示す図面である。

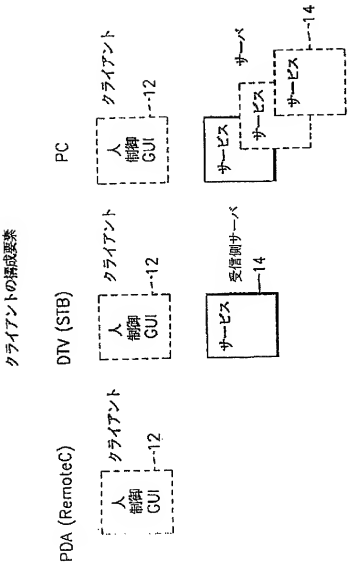
【図２４】　本発明の第１観点に係る翻訳サービスを提供するためのパケットタイプとフォーマットの部分的なリストテーブルの第１実施形態を示す図面である。

【符号の説明】

１０　ネットワーク
１２　クライアントデバイス
１４　サーバデバイス
１６　通信リンク
１８　ＧＵＩディスプレイ
２０　サーバ制御プログラム
２２　グラフィック制御対象（ＧＣＯ）使用者インタフェース説明書
２４　クライアントデバイスレンダラ
２６　制御状態データ
２８　クロック
３０　命令語インタフェース
３２　データストリーム送信側ハードウェア
３４　データストリーム受信側ハードウェア
３６　セッションマネージャ
４０　サービスの機能的規格ブロック
４２　メッセージ要素が構成されるブロック
４４　産業標準化フォーマットブロック
４６　メッセージ圧縮ブロック
４８　メッセージ文字列構成ブロック
５０　ソフトウェアクライアント制御プログラム
５２，５４，５８，６０　ブロック
５６，６２　ルックーアップテーブル
６４　ライブラリデバイス
６６　通信スタック
６８　XML層OUT
７０　XML層IN
７２　XMLインタフェース
７４　XMLパーサ
７６　XMLRPCコーデック
７８　インタフェースフェッチャ
７９　ホームネットワーク対象要請ブローカ
８０　ホームネットワークインタフェースライブラリ
８２　制御器アプリケーションプログラムコード

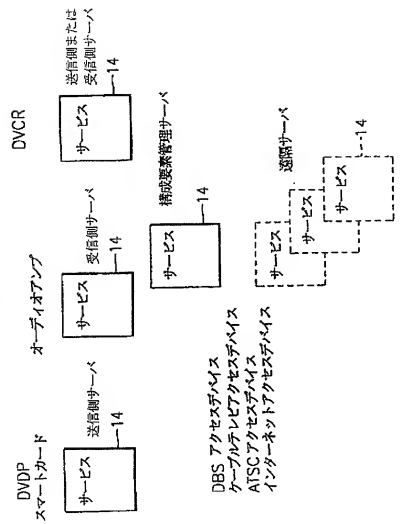
８４　アプリケーションプログラムコード
８６　ホームネットワークデバイスウェブサーバ
８８　固有ルックアップテーブル
９０　ハンドラ
９２　ハードウェアサービス
９４　固有インタフェース
９６　第３デバイス
９８　ミドルウェア階層
１００　データベース
１０２　ＣＥデータベース
１０４　ＸＣＥデータベース
１０６　ホームネットワークインタフェースライブラリ
１０８　製造会社手段
１１２，１１４，１１６，１１８　階層
１２０　送信デバイス
１２２　受請デバイス
１２４　翻訳デバイス
【誤訳訂正４０】
【訂正対象書類名】図面
【訂正対象項目名】図５
【訂正方法】変更
【訂正の内容】

【図５】



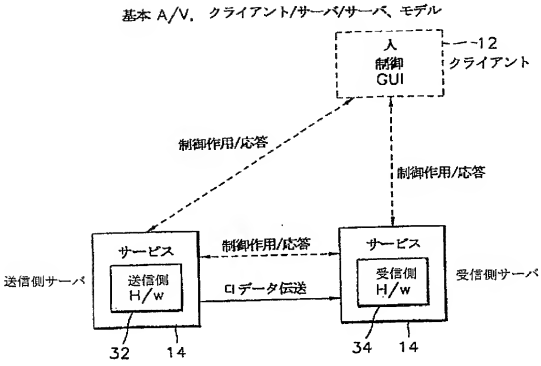
【誤訳訂正４１】
【訂正対象書類名】図面
【訂正対象項目名】図６
【訂正方法】変更
【訂正の内容】

【図６】



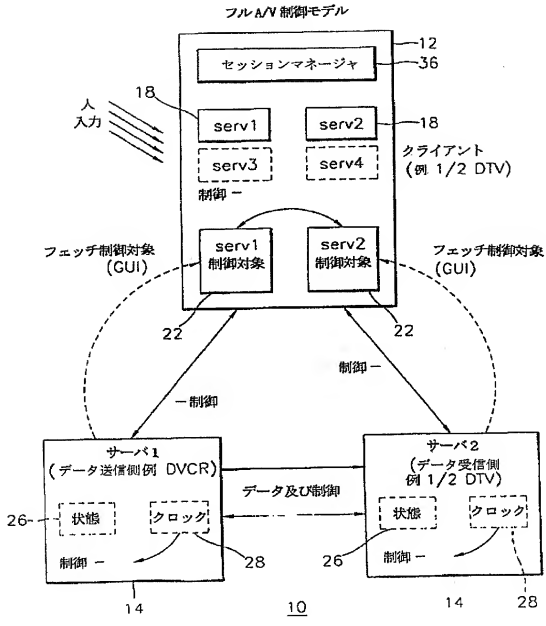
【誤訳訂正４２】
【訂正対象書類名】図面
【訂正対象項目名】図８
【訂正方法】変更
【訂正の内容】

【図８】



【誤訳訂正４３】
【訂正対象書類名】図面
【訂正対象項目名】図９
【訂正方法】変更
【訂正の内容】

【図９】


フルA/V制御モデル
12
セッションマネージャ
36
18
人
入力
serv1
serv2
18
serv3
serv4
クライアント
(例 1/2 DTV)
制御－
フェッチ制御対象
(GUI)
serv1
制御対象
serv2
制御対象
フェッチ制御対象
(GUI)
22
22
制御－
－制御
サーバ1
(データ送信側例 DVCR)
サーバ2
(データ受信側
例 1/2 DTV)
データ及び制御
26
状態
クロック
状態
クロック
制御－
28
26
制御－
14
10
14
28

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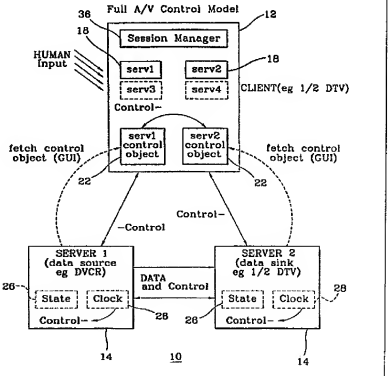
(54) Title: METHOD AND APPARATUS FOR UNIVERSALLY ACCESSIBLE COMMAND AND CONTROL INFORMATION IN A NETWORK

(57) Abstract

A method and system for performing a service on a home network, by: connecting a first and a second home device to the home network; providing a database including a plurality of application interface description data objects, where each application interface description data object includes information in a structured format for commanding and controlling of a home device by one or more other home device connected to the network; the second home device accessing a first application interface description object for the first home device in the database; the first home device accessing a second application interface description object for the second home device in the database; sending control and command data from the first home device to the second home device utilizing the second application interface description object over the network; and sending control and command data from the second home device to the first home device utilizing the first application interface description object over the network. Whereby, the first and second home devices perform said service.



Method and Apparatus for Universally Accessible Command and Control Information in a Network

Technical Field

The present invention relates to the field of network systems, and more particularly, to home network having multiple devices connected thereto.

Background Art

A network generally includes a communication link and various devices with communication capability connected to the communication link. The devices include computers, peripheral devices, routers, storage devices, and appliances with processors and communication interfaces. An example of a network is a home network for a household in which various devices are interconnected. A usual household can contain several devices including personal computers and home devices that are typically found in the home. As such the term "device" typically includes logical devices or other units having functionality and an ability to exchange data, and can include not only all home devices but also general purpose computers. Home devices include such electronic devices as security systems, theater equipment, TVS, VCRs, stereo equipment, and direct broadcast satellite services or (DBSS), also known as digital satellite services (DSS), sprinkler systems, lighting systems, micro waves, dish washer, ovens/stoves, washers/dryers, and a processing system in an automobile.

In general, home devices are used to perform tasks that enhance a homeowner's life style and standard of living. For example, a dishwasher performs the task of washing dirty dishes and relieves the homeowner of having to wash the dishes by hand. A VCR can record a TV program to allow a homeowner to watch a particular program at a later time. Security systems protect the homeowner's valuables and can reduce the homeowner's fear of unwanted entry.

Home devices, such as home theater equipment, are often controlled using a single common control unit, namely a remote control device. This single common control unit allows a homeowner to control and command several different home devices using a single interface. Thus, may manufacturers have developed control units for controlling and commanding their home devices from a single interface.

One drawback associated with using the remote control unit to command and control home devices is that it provides static and command logic for controlling and commanding each home device. Another drawback associated with using remote control units is that known remote control units cannot control a plurality of diverse devices, and more particularly, cannot control a plurality of devices having different capabilities to communicate with each other in order to accomplish tasks or provide a service.

In conventional network systems a user provides commands using a remote control unit or device control panel. Once the user ceases, there is no controller unit or device in the network to provide commands for automatic operation. After a user initially controls and commands a first set of devices, conventional systems do not provide a mechanism for the first set of devices to automatically communicate with a second set of devices in the network as necessary in order to accomplish tasks without direct user control and command of the second set of devices. Further, conventional systems do not provide an efficient method for various network devices to obtain information about other network devices in the network for command and control.

There is, therefore, a need for a method and a system which provides dynamic control and command devices in a home network. There is also a need for such a method and system to provide the ability to control a plurality of diverse devices having different capabilities to communicate with each other in order to accomplish tasks or provide a service. There is also a need for such a method and system to provide the ability for various network

devices to automatically command and control other various network devices. There is also a need for such a method and system to provide universally accessible command and control information for inter-device communication.

Summary of the Invention

The present invention satisfies these needs. In one embodiment the present invention provides a method and system for performing a service on a home network, by: connecting a first and a second home device to the home network; providing a database including a plurality of application interface description data objects, where each application interface description data object includes information in a structured format for commanding and controlling of a home device by one or more other home devices connected to the network; the second home device accessing a first application interface description object for the first home device in the database; the first home device accessing a second application interface description object for the second home device in the database; sending control and command data from the first home device to the second home device utilizing the second application interface description object over the network; and sending control and command data from the second home device to the first home device utilizing the first application interface description object over the network. Whereby, the first and second home devices perform said service.

In one version of the invention, the first home device stores first application interface data therein, and the second home device stores second application interface data therein. The database is formed by querying the first and second home devices to transfer said application interface data for the first and second home devices to the database device. The database can be stored in a database device and connected to the network for universal access by network devices. In that case, the first application interface description object for the first home device can be provided from the data base to the second home device over the network. Further, the second

application interface description object can be provided from the data base to the first home device over the network.

Further, three or more home devices can be connected to the network, wherein at least one home device accesses the database to query the application interface description objects of a plurality of home devices for sending command and control data to the plurality of home devices over the network. Each application interface description object can include data in a structured format. The structured format can include XML format.

Brief Description of the Drawings

These and other features, aspects and advantages of the present invention will become better understood with regard to the following description, appended claims and accompanying drawings where:

Figure 1 shows a block diagram on an embodiment of a network according to one aspect of the present invention;

Figure 2 shows the block diagram of Figure 1 in an example device control and communication scenario;

Figure 3 shows a block diagram of an example home network system according to the present invention which includes a plurality of client and server devices;

Figure 4 shows a block diagram of example embodiments of a client device and a server device of Figure 3;

Figure 5 shows example embodiments of client devices;

Figure 6 shows example embodiments of server devices;

Figure 7 shows a block diagram of two example networked server devices capable of communication with, and control of, one another;

Figure 8 shows a block diagram of an example architecture of an audio/video (A/V) model including examples of a source server device, a sink server device and a client device in a network;

Figure 9 shows another example audio/video (A/V) model;

Figure 10 shows an example capabilities data table for a network

device;

Figure 11 shows an example attribute data table for a network device;

Figure 12 shows an example configuration of building blocks for generating command messages among networked devices;

Figure 13 shows another example configuration of the building blocks of Figure 12 for generating command messages;

Figure 14 shows three examples of interaction among networked client and server devices;

Figure 15 shows an example block diagram for definitions of API extensions of networked device interfaces;

Figure 16 shows an example architecture for a server device application accessing the interface description document of another server device;

Figure 17 shows another example inter-device control architecture between a controller server device and a controlled server device;

Figure 18 shows an embodiment of an XML protocol providing a Web standard common middleware layer in a communication stack at the API level between networked devices;

Figure 19 shows another embodiment of server device to server device command and control architecture;

Figure 20 shows the relationship between a device interface library and consumer electronics definition data base for home devices;

Figure 21 shows hierarchal form of an embodiment of a device interface definition;

Figure 22 shows an example of layers in device interface definition of Figure 21;

Figure 23 shows a command transmission and interpretation process between a sender and receiver device; and

Figure 24 shows an example table of a partial list of packet types and formats for providing translation services according to an aspect of the present invention.

Detailed Description of the Invention

In one aspect, the present invention provides inter-device communication in a network such as a home network. As home devices become more intelligent and can share information, inter-device communication allows a user to interconnect devices in a network to take advantage of the information sharing capabilities of those devices. As such, inter-device communication plays a crucial role in affording a user with the ability to fully and flexibly utilize the networked devices.

Referring to Figure 1, in an embodiment of the present invention, a network 10 includes at least one client device 12 and at least one server device 14 interconnected via a communication link 16. The communication link 16 can include a 1394 serial bus providing a physical layer (medium) for sending and receiving data between the various connected home devices. The 1394 serial bus supports both time-multiplexed audio/video (A/V) streams and standard IP (Internet Protocol) communications. In certain embodiments, a home network uses an IP network layer as the communication layer for the home network. However, other communication protocols could be used to provide communication for the home network.

Each client device 12 may communicate with one or more server devices 14 in the network 10. Further, each server device 14 may communicate with one or more other server devices 14, and one or more client devices 12, in the network 10. Each client device 12 can include a user communication interface including input devices such as a mouse and keyboard for receiving user input, and a display for providing a control user interface for a user to interact with the networked devices. The user interface can include a graphical user interface (GUI) display 18 for providing information to the user. Referring to Figure 2, as defined herein, each server device 14 provides a service for the user, except control user interface, and each client device 12 provides control user interface for user interaction with the network 10. As such, only client devices 12 interact directly with users,

and server devices 14 interact only with client devices 12 and other server devices 14. Example services can include MPEG sourcing/sinking and display services.

Figure 3 shows a block diagram of an example home network 10 that includes a plurality of client devices 12 and a plurality of server devices 14. Each server device 14 may include hardware as a resource in the network for providing services to the user. Further, each server device 14 may store a server or service control program 20 for controlling the server hardware, and include a graphical control object (GCO) user interface description 22 for user interface with the server control program 20 as shown in Figure 4.

For control between a controlling client device 12 and a controlled server device 14, the client device 12 accesses the GCO 22 of the server device 14 by, for example, transferring the GCO 22 from the server device 14 to the client device 12 over the network. The client device 12 then uses the transferred GCO 22 to create a control user interface GUI 18 for the user to communicate with the control program 20 of the server device 14 from the client device 12 over the network. The user provides command and control to at least the control program 20 of the server device 14 from the client device 12.

Storing the GCO 22 of each server device 14 in the server device itself may reduce the processing and storage requirements of the client devices 12 in networks with several server devices 14. Further, storing the GCOs 22 in the server devices 14 may allow each server device 14 to provide its own GUI look and feel to the user, and allows for modification or updating of the GCOs 22 without modifications to client devices 12.

Referring to Figure 4, to provide command and control between a client device 12 and the server device 14, in one embodiment, the client device 12 can include a renderer 24 for displaying a GUI 18 using a GCO 22

stored in the client device 12 or transferred to the client device 12 over the network from a desired server device 14. For example, in an initial device selection phase, the client device 12 can fetch the GCO 22 of at least one server device 14 over the network, and the renderer 24 displays a GUI 18 using the GCO 22 for controlling the server device 14. Preferably, the GUI 18 is customized to the server device 14 and can include a built-in command set for controlling the server device 14.

In addition, the GUIs 18 of various server devices 14 may include commonalities such as: (1) a common GCO model type for the client device renderer 24 to display GUIs 18, (2) common communication protocols for transferring the GCOs 22 from various server devices 14 to the client device 12, and (3) common communication protocols for GUI interaction from the client device 12 to the control program 20 of the corresponding server device 14, wherein the client device 12 does not require a built-in knowledge of a particular server device 14 being controlled.

Referring still to Figure 4, a server device 14 may include one or more server control programs 20 to control the server hardware for providing a service. The GUI interface 18 from the GCO 22 of the server device 14 provides interface to the server device control programs 20. The server device 14 may also include control state data 26 indicating the control status of the server device 14 and server device hardware in providing a requested service.

For example, the control state data 26 can include the status of control information in the GUI 18 for the server device 14, such as timer setup for a recording action in a VCR server device. The control state data 26 is stored in the controlled server device 14, and displayed to a user through the GUI 18 of the server device 14 at the controlling client device 12, for user control of the server device 14. Preferably, the controlling client device 12 for displaying the GUI 18 of the server device 14 does not retain knowledge of the control

state data 26 for the controlled server device 14.

Each server device 14 can be controlled by one or more client devices 12. As such, the control state data 26 stored in the server device 14 includes status of the information in the GUI 18 of the server device 14 at each of the controlling client devices 12. For example, when the user controls a server device 14 using a first client device 12, upon completion of the user control, the information in the GUI 18 of the server device 14 at the first client device 12 is saved by the server device 14 in the control state data 26 of the server device 14.

Alternatively, while the user is interacting with the GUI 18 of the server device 14 at the first client device 12, the control state data 26 of the server device 14 is updated with the information in the GUI 18 of the server device 14 at the first client device 12, and upon completion of user control, the control state data 26 is retained in the server device 14. When the user controls the server device 14 using a second client device 12, the control state data 26 is made available to the user via the GUI 18 of the server device 14 at the second client device 12 for further control. The user can also use the first client device 12 at a later time to control the server device 14, whereupon the control state data 26 is made available to the user via the GUI 18 of the server device 14 at the first client device 12 for further control. The server device 14 can also include a clock 28, or maintains the current time, to allow time delay action based on time or clock input from a user, as described below.

A client device 12 and a server device 14 can be physically bundled together as one unit such as a DTV. In that case, the server device 14 includes a control program 20 for controlling the server hardware, and the client device 12 provides control user interface to the server control program 20 for control and command of at least the server hardware. Figure 5 shows examples of client devices 12 that may include: (1) a PDA(RemoteC) for

displaying a GUI, (2) a DTV(STB) for displaying a GUI and including a sink server comprising audio and/or video program streak destination server, and (3) a PC for displaying a GUI and including at least one server device for providing multiple services. Hardware and executables in a DTV or PC client device can also be controlled by other client devices. Figure 6 shows example server devices 14, including: (1) a DVDP SmartCard as a source server device, (2) an Audio Amplifier as a sink server device, (3) a DVCR as either a source or a sink server device, and (4) a Management Server for managing remote server devices. The Management Server can be included in a DBS-STB, Cable TV-STB, or ATSC-STB, for example. Such devices include a Management Server for local control or management of the internal workings of the STB. Further, external servers accessed through an external network can be utilized by local client devices for services such as Video-on-Demand, Enhanced-TV, and Internet commerce, for example.

Referring to Figure 7, communication and control between two server devices 14 is accomplished by the control programs 20 of the server devices 14 communicating command and control data therebetween. A server device 14 can control one or more other server devices 14 over the network. And, a server device 14 can be controlled by one or more server devices 14, and by one or more client devices 12. Further, a user can utilize a client device 12 to control and command a first set of server devices 14, and the first set of server devices 14 can automatically command and control a second set of server devices 14 without user involvement, as necessary to perform services to the user.

For example, for automatic time-delay operation, a user can "log on" to a client device 12 to control a first set of server devices 14 and specify desired services. The user then "logs off" from the client device 12. The first set of server devices 14 perform communication and control among themselves, and at a later time, one or more of server devices 14 in the first set automatically control a second set of server devices 14 as necessary to

collectively provide the desired services without user involvement.

Figure 7 shows example embodiments of two server devices 14 capable of communication with, and control of, one another. Each server device 14 includes a control program 20, a clock 28 and control state data 26 described above. Each server device 14 can also include a GCO 22 for the server device 14 to be directly controlled by a client device 12. However, a GCO 22 does not need to be included in a server device 14 that is not directly controlled by a client device 12 and only communicates with other server devices 14. Each server device 14 also includes a command language (CL) interface 30 and a library of commands. The library of commands includes the commands that the server device 14 utilizes to send and receive information for providing its service. However, a command language is not necessary for user control as shown in Figure 4 and described above.

Figure 8 shows an example audio/video (A/V) model including a source server device 14, a sink server device 14 and a client device 12 in the network. The source server device 14 includes a control program 20 for controlling data stream source hardware 32 of the source server device 14, and the sink server device 14 includes a control program 20 for controlling data stream sink hardware 34 of the sink server device 14. In an example operation, a user utilizes the client device 12 to control the source server device 14 to start the data stream source hardware 32, and to control the sink server device 14 to start the data stream sink hardware 34. Upon initiation of data transfer from the data stream source hardware 32 to the data stream sink hardware 34, the user can relinquish the client device 12. Alternatively, the user can program the initiation of the data transfer for a future time and relinquish the client device 12. Thereafter, the data stream source hardware 32 of the source server device 14 and the data stream sink hardware 34 of the sink server device 14 automatically initiate the data transfer at the time programmed by the user.

For example, the data stream source hardware 32 can include a Tuner-Access Device such as a Direct Broadcast Satellite (DBS). A DBS is a multi-channel alternative to cable television .and provides cable-like television programming directly from satellites on small (18 inch to 3-foot diameter) satellite dishes. With DBS, several standard analog television signals are digitally compressed onto a single satellite transponder thereby allowing up to 200 or more channels receivable with a dish pointed at a fixed position in the sky. The data stream sink hardware 34 can include a Digital Video Cassette Recorder (DVCR) which comprises s digital VCR that is able to decode compressed digital video signals on playback. The user provides command and control data including "time-delay record" event data for the DVCR and a "time-delay select a program" event data for the Tuner-Access Device. After the time-delay, the Tuner-Access Device selects the desired program, and sources program data to the DVCR which receives and records the program data without further control actions from the user.

Figure 9 shows another example audio/video (A/V) model including at least a source server device 14 SERVER1, a sink server device 14 SERVER2 and a client device 12 in the network 10. The client device 12 includes a session manager 36 with a user interface for displaying selection information for a user to select and control the server devices 14 SERVER1, SERVER2 and other server devices 14 such as SERVER3 and SERVER4 (not shown). The selection information can include iconic symbols designated as Serv1, Serv2, Serv3 and Serv4 in the session manger 36 for a user to select the server devices 14 SERVER1, SERVER2, SERVER3 and SERVER4, respectively. The source sever device 14 SERVER1 can include a DVCR and the sink server device 14 SERVER2 can include a 1/2DTV.

In one example operation, upon selection of the server devices 14 SERVER1 and SERVER2, the client device 12 transfers the GCO 22 of each server device 14 to the client device and displays a corresponding GUI 18 for each of the server devices 14 SERVER1 and SERVER2. The user can

interact with the GUI 18 of each server device 14 to provide command and control to the corresponding server device 14 for service. Each server device 14 can provide service alone or in combination with other server devices 14. Further, the session manager 36 transfers control state data 26 between the GUIs 18 of the server devices 14 in the client device 12 as necessary for the corresponding server devices 14 to perform a service. Based on the user command and control information, two or more of the server devices 14 can communicate command and control information therebetween to provide a user requested service.

The session manager 36 can include a software agent which functions to access and display available home network services provided by various server devices 14 in the network 10. The software agent can additionally match the capabilities of various server devices 14 in the network 10 and display selection information for only those server devices 14 that have compatible capabilities. Further, the session manager 36 can match the selections made in the GUI 18 of one server device 14 to the selections in GUI 18 of another server device 18 to help the user provide meaningful command and control information to the server devices 14.

In another example operation, the session manager 36 executes the software agent which searches the network and discovers the server devices 14 connected to the network. The software agent also accesses capabilities data stored in each server device 14 to determine the capabilities of the server devices 14 and provide information about those capabilities to the user. The session manager 36 then displays the selection icons Serv1, Serv2, Serv3 and Serv4 for the server devices SERVER1, SERVER2, SERVER3 and SERVER 4 as shown in Figure 9.

The session manager 36 initially enables all the selection icons Serv1, Serv2, Serv3 and Serv4 to allow the user to select from among all four selection icons. After the user selects the server device SERVER1 by clicking

on the Serv1 selection icon, the session manager 36 determines that the server devices SERVER3 and SERVER 4 are incompatible in capability with the server device SERVER1. As such, the session manager 36 disables the selection icons Serv3 and Serv 4 for server devices SERVER3 and SERVER4, respectively. The user can then click on the icon Serv2 to command and control the server device SERVER2.

As the user interacts with the GUI 18 of a selected server device 14, control and command information input by the user into each GUI 18 provide additional capabilities information which affect further server device selections by the user. For example, if a VCR server device 14 is selected, further action by the session manager 36 in enabling or disabling selection icons for other server devices 14 is affected by a user decision to play or record.

Each server device 14 in the network has one or more service capabilities as discussed above by way of example with reference to the server devices in Figure 9. Each service capability includes sourcing or sinking of information. For example, a TV has the sinking capability of receiving video and audio streams, a VCR device can source (transmit) and sink (receive) video and audio signals, and a PC may be able to transmit and receive video, audio and data. Each sourcing capability has a complementing, and compatible, sinking capability. Similarly, each sinking capability has a complementing, and compatible, sourcing capability. For example, a video output capability of one device is complemented by a video input capability of another device.

Since each device 14 can be a source or sink for several different services on the network, each device 14 stores a capabilities data table (Capabilities Table 1) as shown by example in Figure 10. The first column of Table 1 identifies the service capabilities of a device 14, and the second column identifies whether the device 14 is a source or a sink for a corresponding service in the first column. Using the capabilities data Table 1,

new services can be implemented while maintaining compatibility with older devices. For example, if a new service is developed that is compatible with an older service, both the new and the old service can be entered into the capabilities data Table 1 for a device implementing the new service, whereby the implementing device remains compatible with older devices using the old service.

In one implementation, a Device Manager conducts a matching or comparison of device source and sink services. For example, the Device Manager can be implemented as a software agent to compare the capabilities or properties of various devices 14 and locate devices 14 with matching capabilities. For example, in a case where the service is a media stream from a first device 14 across the network to a second device 14, the Device Manager compares the capabilities of the first and second devices 14 to assist the user in making a sensible selection of the second device 14 which is compatible with the capabilities of the first device 14. The following is an example list of service capabilities for an embodiment of a server device 14:

Stream_format_video_dv
Stream_format_video_mpeg2tpt
Stream_format_video_dsstpt
Stream_format_video_mpeg2pes
Stream_format_video_mpeg210801-tpt

Each device 14 can further store an attribute data table (Attribute Table 2) including pertinent attributes of the device, shown by example in Figure 11. A name and a value define each attribute within Table 2. Though character lengths are shown in Table 2, they are not required. The attribute data is available to other devices 14 on the network 10 to facilitate interoperability and to store device information. For example, a Device Page as described below uses the Attribute Table 2 to store the device name. Other fields can be added to the attribute data Table 2 as necessary.

In the user-to-client device control model described above, attribute data can be displayed on the GUI page of the server device 14 at the client

device 12. Alternatively, a second level device information home page can be utilized to display said attribute data. Further, the attribute data in the form of a text or Extensible Markup Language (XML) file can be accessed by a software agent. For the device-to-device control model, the attribute data for the controlled device is stored in the device interface application interface.

The Device Location attribute field in the Attribute Table 2 is used to store the location or group for each device 14. The Device Type attribute field specifies the device type, such as VCR, DVD, DTV, Camcorder, PC, Security System, etc. for the particular device 14. The Device Type attributes field is used to select a default device icon to represent the device within the Device Page if the device itself does not supply one. The Attribute Table 2 can include multiple entries for the Default Source and the Default Sink attributes fields. Each such entry represents a different default source or sink device 14 for each data type handled by the device 14.

Preferably, the capabilities and attributes data are packaged into structured data using a hierarchical language. This provides a common method of retrieving the capabilities and attributes data that are used for other purposes such as in GCO transfer and server device-to-server device control. As an example, the attributes data can include the following structured data format:

```
<DEVICEATTRIBUTES>
        <ATTRIBUTE name=DeviceManufacturer value="Samsung Inc.">
        <ATTRIBUTE name=Manufacturer URL value=www.samsung.com>
        <ATTRIBUTE name=ManufacturerIcon value="logo.gif">
        <ATTRIBUTE name=DeviceName value="Samsung DSS">
        <ATTRIBUTE name=DeviceModel value="SCH1900">
        <ATTRIBUTE name=DeviceType value=DDS>
        <ATTRIBUTE name=DeviceLocation value="Livingroom">
        <ATTRIBUTE name=DeviceIcon value="device.gif">
        <ATTRIBUTE name=DeviceAddress value=105.144.30.17>
</DEVICEATTRIBUTES>
```

As an example, the capabilities data can include the following structured format:

```
<DEVICECAPABILITIES>
    <CAPABILITY type=MPEG2 value=Source>
    <CAPABILITY type=MPEG2 value=Sink>
    <CAPABILITY type=MPEG3 value=Source>
    <CAPABILITY type=MPEG3 value=Sink>
</DEVICECAPABILITIES>
```

An application interface language is utilized to allow different server devices 14 to perform device-to-device control, including sever device-to-server device control. The application interface language includes command languages, and can be described using XML, as detailed below. The control program 20 of one server device 14 remotely controls the control program 20 of another server device 14 over the network, without using GUIs 18 or user involvement. An example of device-to-device control is automatic operation. A user initially provides control through a client device 12 for a desired service, and subsequently two or more server devices 14 automatically communicate and control one another without further user interaction to provide the service.

Referring to Figures 12 and 13, preferably a standard application interface language is utilized to allow interoperability among various control programs 20 in various server devices 14. In one embodiment, the standard application interface language includes the following building blocks: (1) functional specification of service 40 such as in a service function database, (2) a block where elements of a message are composed 42, (3) industry standard format 44, (4) message compression 46, and (5) message string construction 48 to output structured message data.

Figure 12 shows an example configuration of the building blocks to perform the function of generating command messages. Each message item is composed from the functional specification of service and standardized by selecting an industry standardized compressed form (Hex) label for the

message item. A group of such message items are assembled to create a complete command string. Existing command languages such as CAL and AV/C operate as shown in Figure 12. However, such command language mechanisms specify binary or hex code messages and system operation on physical devices on the physical interface, and are based on hardware specifications. Therefore, such command languages may be less desirable for a network layer based control mechanism where a control system specification includes naming, addressing, device capability discovery, communication language and command messages at the application level software level, where one software application program 20 in a controller device 14 locates and controls another software application 20 program in a controlled device 14 over the network 10. Said control mechanism is more suitable for devices such as digital appliances including appliances (e.g., DVCR) as well as multi-purpose, multi-application devices such as computers.

Figure 13 shows a preferred example configuration of the building blocks of Figure 12 to perform the function of generating command messages. In Figure 13, the positions of the industry standard format 44 and the message compression 46 are different than in Figure 12. A number of textual standard forms are selected from the functional specification service 40 to make a complete message. Later the message may be compressed by a lower layer of the protocol stack. Figure 13 represents a method of performing service or device command and control for consumer electronics (CE). Message composition can be defined by the XML standard syntax and compression can be performed by another protocol layer such as HTTP. A command interface language is utilized at the application software 20 interface level, rather than lower hardware levels. As such, the network protocol stack is governed by commands in said language, and each of a controller device 14 and controlled device 14 can be viewed as integrated components of the network for message transmission therebetween.

Referring to Figure 14, three different instances of interaction among client devices 12 and server devices 14 are shown. In the first instance "A", a human user communicates with a remote service application "S". The user utilizes a browser in a client device 12 as the user interface, wherein the browser controls service programs 20 in the service application "S" and receives response in Hyper Text Markup Language (HTML) or XML formats. A secondary server is included with the browser to accept XML based asynchronous command message postings. For example, for a DVCR the secondary server 14 can accept command messages such as "VCR FAILED: TAPE BROKE." A software agent including a browser can be utilized to display the command messages for a user in the browser's GUI for later attention by the user and control of the DVCR. Preferably, an XML based client device 12 includes an HTTP1.1 server capability to respond to command initiated elsewhere for server device to server device command and control.

In the second instance "B", the user is replaced by a software client control program 50. The software client control program 50 generates XML based command postings to the service application "S" and receives back XML command postings. And, in the third instance "C", the software client control program 50 is replaced by an application such a server device control program 20, wherein commands and responses are exchanged between two service applications 20. In that regard, instance "B" is a special case of instance "C" with a null service.

An application interface language based on XML is used for control between a first server device 14 and a second sever device 14 (device-to-device or service-to-service) for devices or services that are world wide web (Web) enabled and Internet enabled. The application interface language is based on the Web standard, middleware layer. In one embodiment, device-to-device control includes remotely controlling the control program 20 or Application, in one server device 14 from another server device 14 in the

network 10. As such, the interfaces (API) to such Applications 20 are made available over the network using API extensions. Preferably, the API extensions utilize a standard format, such as an XML-based interface, to provide overall interoperability.

Referring now Figure 15, there is shown block diagram definitions of API extensions for a first *Application A*, designated as *Service A*, and a second *Application B*, designated as *Service B*, communicating over the network 10. For example, the *Service A* can be the control program for a first server device *A* in the network, and the *Service B* can be the control program for a second server device *B* in the network. The server device *B* sends commands to the server device *A*. For this example, the first and second service devices *A* and *B* can include CE devices.

Referring to the API extensions for the *Service A*, the first upper-most block 52 provides a comprehensive definition or data base of CE objects and methods using English words to describe CE devices. The comprehensive definition or data base can also be in C, XML or other formats capable of representing objects and their respective methods. The comprehensive definition or data base utilizing XML is termed XCE definition. The second block 54 provides a format for representation of an API in XML form for all devices 14, designated as an interface data type definition INTERFACE.DTD.

A software agent, designated as *Tool A*, utilizes a subset of the XCE definition for *Service A*, and uses the interface data type INTERFACE.DTD for *Service A* to create an XML form document, INTERFACE-A.XML. The document INTERFACE-A.XML describes the objects and methods supported by the *Service A* according to the document type definition INTERFACE.DTD for *Service A*. Other data type definitions can also be used to create the INTERFACE-A.XML document.

The software *Tool A* also creates a look-up table 56 to convert from

XML messages from *Service B* on the network interface, to API definitions for *Service A*, programmed in C for example, and complied to executable binary. Preferably, the look-up table 56 is created at compile time, whereby during run-time, incoming XML form method messages (commands) from *Service B* are converted to the API format created by the complied application C code for *Service A*. The look-up 56 table provides run-time translation of XML object method calls from *Service B* into device native language calls for *Service A*. The look-up table 56 is complied with the device control program 20 for local execution on the server device *A* for *Service A*.

The INTERFACE-A.XML can be used by *Service A* for validity checks if it encounters an error in a received message. The INTERFACE-A.XML can also be used by a foreign Application such as *Service B* to determine the message format for *Service A* before communicating with *Service A*. Further, if a message from *Service B* to *Service A* causes an error, *Service B* can access the INTERFACE-A.XML document to diagnose the error.

Referring to the API extensions for the *Service B*, the first block 58 provides a comprehensive definition or data base of CE objects such as the XCE definition for *Service A* above. The next block 60 provides a language definition for making XML form method (command) calls to remote API services or devices such as the API for *Service A*. The language definition is a document type definition Method Request CALL.DTD which describes interaction with objects on the network.

A software agent, designated as *Tool B*, utilizes at least a subset of the objects and methods in the XCE definition for *Service B* and the CALL.DTD document, to generate a look-up table 62 for converting commands from a complied C program code for *Service B* into XML form method requests. As such, the look-up table 62 provides conversion between a method invoked by *Service B* (e.g., "PLAY") and the XML document or message that carries the method call across the network interface to *Service A*, for example. The

subset of the XCE definition used by software *Tool B* depends on the extent and nature of use of the network. For example, the subset can be selected to provide global or restricted use of all available services on a home network.

Therefore, the API extensions provide for communication between various devices on the network using XML. In the example above, the program code 20 for *Service B* generates method calls to an API, and the API calls are converted to XML form to comply with the Web/Internet standard XML for inter-device communication. The XML method calls (messages) are sent to *Service A* over the network, and *Service A* reconverts the XML method calls from the network interface to program code API definitions for *Service A*. This conversion and re-conversion provides Web/Internet compatibility for diverse devices in the network with program code APIs which would otherwise require binary compatibility between different devices. Examples of the XML interface blocks utilizing the block diagrams in of Figure 15 are shown below.

```
-----------------------------------------------------------------------
      interface.dtd

      rules for describing an object interface in xml
-----------------------------------------------------------------------


<!ELEMENT    paramater    #PCDATA>
<!ATTLIST    paramater
             Type         CDATA #REQUIRED
             >

<!ELEMENT    method       (#PCDATA, (parameter)+)>

<!ELEMENT    method       (#PCDATA, (method)+)>

-----------------------------------------------------------------------
             interface.h

             example object interface in c
-----------------------------------------------------------------------

/* object */

typedef struct Stream {
      int id;
```

```
};

/* methods */

void StreamPlay (int id, int speed);
void StresmStop (int id);

-----------------------------------------------------------------
      interface.xml

      the same object in xml using ruels of interface.dtd
-----------------------------------------------------------------

<object>Stream
      <method>Play
            <parameter type="int">id</parameter>
            <parameter type="int">speed</parameter>
      </method>
      <method>Stop
            <parameter type="int">id</parameter>
      </method>
<object>

-----------------------------------------------------------------
      call.dtd

      rules for describing a c function call in xml
-----------------------------------------------------------------

<!ELEMENT   parameter   #PCDATA>
<!ATTLIST   parameter
            value       CDATA #RREQUIRED
            >

<!ELEMENT   method      (#PCDATA, (parameter)+)>
<!ELEMENT   object      (#PCDATA)>
<!ELEMENT   call        (object,method)>


-----------------------------------------------------------------
      controller.c
      example controller command in c
-----------------------------------------------------------------

.
.
.
StreamPlay (0x01ae, 500);
.
.
.

-----------------------------------------------------------------
      call.xml
```

the same command in xml using call.dtd

```
<!-- example to play a stream -->

 <call>
       <object>Stream</object>
       <method>Play</method>
       parameter value="500">speed</parameter>
 </call>
```

Further, the above provides examples of interface definitions INTERFACE.DTD and CALL.DTD used to create description documents of available services, INTERFACE.XML, described above. The CALL.DTD definition includes a rule set for generating method call or function call message such as XML Remote Procedure Call (RPC) or XMLRPC messages. The CALL.DTD definition describes an output interface of a controller service 14. In a home network, for example, INTERFACE.XML represents the services available on the home network. The available services are a subset of the entire services in the CE space.

In a One-Touch-Record (OTR) scenario, a user is in control of a Tuner-Access-Device such as a Satellite STB. The user controls the tuning using an Electronic Program Guide (EPG) such as a graphical user interface representation of program listings. OTR record provides the user with a service including selection of a future program from the EPG for recording without the user accessing the VCR graphical user interface to program the VCR for a Time Delayed Recording. OTR automates the control of the VCR. Below is an example control list of actions in OTR.XML: (1) StreamOpen = play the selected program stream output to the network from a Satellite STB; for OTR this control is local to the STB device; (2) StorageOpen = open a storage service; and (3) StorageRecord = Send the Record command across the network to the VCR.

call.dtd

```
      rules for describing a c function call in xml
-------------------------------------------------------------------

<!ELEMENT   parameter   #PCDATA>
<!ATTLIST   parameter
            value       CDATA #REQUIRED
            >

<!ELEMENT   method      (#PCDATA, (parameter)+)>
<!ELEMENT   object      (#PCDATA)>
<!ELEMENT   call        (object,method)>

-------------------------------------------------------------------
      interface.dtd

      example for describing an object interface in xml
-------------------------------------------------------------------

<!ELEMENT   parameter   #PCDATA>
<!ATTLIST   parameter
            value       CDATA #REQUIRED
            >

<!ELEMENT   method      (#PCDATA, (parameter)+)>
<!ELEMENT   object      (#PCDATA, method+)>

-------------------------------------------------------------------
      interface.xml

      this document describes various CE services offered -a
      subset of the whole CE space.
-------------------------------------------------------------------

<?xml version="1.0"?>
<!DOCTYPE interface SYSTEM "interface.dtd">

<object>Stream
      <method>Open
            <parameter type="int">id</parameter>
            <parameter type="int">channel</parameter>
      </method>
      <method>Close
            <parameter type="int">id</parameter>
      </method>
</object>
<object>Control
      <method>Set
            <parameter type="int">id</parameter>
            <parameter type="int">level</parameter>
      </method>
</object>

<object>Storage
      <method>Open
            <parameter type="int">id</parameter>
```

```
            <parameter type="int">channel</parameter>
      </method>
      <method>Record
            <parameter type="int">id</parameter>
      </method>
      <method>Play
            <parameter type="int">id</parameter>
            <parameter type="int">speed</parameter>
      </method>
      <method>Stop
            <parameter type="int">id</parameter>
      </method>
      <method>Close
            <parameter type="int">id</parameter>
      </method>
</object>

<object>Display
      <method>Open
            <parameter type="int">id</parameter>
            <parameter type="int">channel</parameter>
      </method>
      <method>Render
            <parameter type="int">id</parameter>
      </method>
      <method>Blank
            <parameter type="int">id</parameter>
      </method>
      <method>Control
            <parameter type="int">id</parameter>
            <parameter type="int">cid</parameter>
            <parameter type="int">level</parameter>
      </method>
      <method>Close
            <parameter type="int">id</parameter>
      </method>
</object>


<!-----------------------------------------------------------------
      otr.xml

      an xml representation of one touch record

      c representation:

      StreamOpen (100,2);/* play a stream (pushed by satellite feed
*/
      StorageOpen (24,2);/* open a storage service */
      StorageRecord (24);/* record the stream */

-----------------------------------------------------------------


      <?xml version="1.0"?>
      <!CODTYPE interface SYSTEM "call.dtd">
```

```
<call>
     <object>Stream</object>
          <method>Open</method>
               <parameter value="100">id</parameter>
               <parameter value="2">channel</parameter>
</call>
<call>
     <object>Storage</object>
          <method>Open</method>
               <parameter value="100">id</parameter>
               <parameter value="2">channel</parameter>
</call>
<call>
     <object>Storage</object>
          <method>Record</method>
               <parameter value="100">id</parameter>
</call>
```

As discussed above in relation to Figure 15, a first device *B* can access the INTERFACE.XML document of a second device *A* to examine the device capabilities and API interface details of the second device *A* and determine supported functionality and command details of the second device *A*. In particular, the first device *B* can determine overlapping, and therefore useable, methods supported by first device *B* and the second device *A*. Figure 16 shows an example wherein a first server device *B* including an *Application B* accesses the INTERFACE-A.XML document of a second server device *A* including an *Application A*. The first server device *B* includes a INTERFACE-B.XML document for comparison with that of a INTERFACE-A.XML document in the second server device *A*.

In one scenario, the first server device *B* wishes to control the second sever device *A* in the network. The INTERFACE-A.XML document of the second device *A* is transferred from the second server device *A* to the first server device *B* and used by *Application B* to query the capabilities and API interface methods of the second server device *A*. This allows the first server device *B* to control the second server device *A* utilizing XML remote procedure calls XMLRPC. In another scenario, the first server device *B* performs the above steps after attempting to communicate with the second server device *A* at least once, and failed to establish communication. Yet in

another scenario the first server device *B* queries the INTERFACE-A.XML document in the second server device *A* remotely without transferring the INTERFACE-A.XML document to the first server device *B*.

Upon examining the contents of the INTERFACE-A.XML document, the first server device *B* can create commands for sending to the second server device *A* in XML format as described above. Generally, the first server device *B* can interpret at least a portion of the contents of the INTERFACE-A.XML document that overlaps with a subset of the XCE definition used by the first and second server devices *B* and *A* as described above. If the first server device *B* is unable to interpret a portion of the contents of the INTERFACE-A.XML document, then the first server device *B* can ignore that portion, or fetch an application to assist it in interpreting that portion, by translation as described further below.

Referring to Figure 17, another example device-to-device or inter-device control between a controller server device 14 and a controlled server device 14 is shown. The controller device 14 includes a controller application *E* and the controlled device 14 includes an application executable *C*. The controlled device 14 further includes INTERFACE-A.XML, the application interface description *A* of the application *C*. Application *E* accesses the application interface description *A* in the controlled device 14 to query the capabilities and API interface methods of the controlled server device 14. Application *E* then commands and controls application *C* using XML remote procedure calls to control hardware or service *D* of the controlled device 14. A scheduler device can be a case of a controller device 14, driven by time of day such as Time-Delay-Record controller in a VCR.

In a first example, the application *E* accesses the application interface description *A* by remote query over the network. In a second example, the application *E* accesses the application interface description *A* by transferring a copy of the application interface description *A* from the controlled device 14

to the controller device 14. The application *E* then queries the interface description *A* locally. In a third example, the application interface description *A* is transferred to a library device 64 which provides library space for interface descriptions, and the application *E* remotely queries the interface description *A* in the library. The library device 64 stored the address (URI) of the associated applications available for direct control action and responses.

Referring to Figure 18, the XML protocol provides a Web standard common middleware layer in a communication stack 66 at the API level between applications 20 of various devices 14 in the network. In each device 14, applications at the top of the communication stack send and receive communication messages over the network, and communicate with software layers in the device stack that locally control the device hardware or service software for the device.

A first XML layer API, designated as XML Layer OUT 68, is used for sending messages, and a second XML layer API, designated as XML Layer IN 70, is used for receiving messages. The XCE definition and the XML definition of a method call, namely the document type definition CALL.DTD described above, are used to create the XML Layer OUT 68. Further the XCE definition and the XML definition for a method call, namely document type definition INTERFACE.DTD described above, are used to create the XML Layer IN 70. For example a controller application utilizes the XML Layer OUT 68 and a controlled application utilizes the XML Layer IN 70.

Referring to Figure 19, another embodiment of server device-to-server device command and control architecture is shown. An XML-based control architecture is utilized for device-to-device (service to service) control for Web and Internet enabled devices or services. A first device *A* can remotely control an application 20 in a second device *B* over the network using XML command messages. The interface to each device includes interfaces to the applications in the device, and is described in XML format. Said interfaces

can be extended and made available on the middleware layer for retrieval and interpretation by other devices over the network, as described further below.

Each of the server devices *A* and *B* includes hardware and software for controlling other server devices over the network and for being controlled by other server devices over the network. In Figure 19, the home network device *A* is a controller device or module, and the home network device *B* is a controlled device or module. Each of the devices *A* and *B* includes a local Device XML Interface 72 comprising an interface document INTERFACE.XML and a document type definition INTERFACE.DTD. The INTERFACE.XML document includes a description of the objects, methods and parameters supported by the corresponding device 14. The INTERFACE.DTD document can be used for validity checks specific to the XML interface of the device, as described above.

Each of the devices *A* and *B* also includes an XML parser 74, comprising program code for parsing and validating XML messages, such as XML interface and XMLRPC commands. The XML parser 74 is similar to said XML Layer IN 70 described above with reference to Figure 18. Further, each of the devices *A* and *B* includes an XMLRPC encoder and decoder (codec) 76 for encoding method names and parameters of an outgoing call in an XMLRPC message, and for decoding an incoming XMLRPC message after it is parsed, to retrieve the method name and parameters therein. The XMLRPC codec 76 is independent of the device XML interface 72 and of the device-to-device control architecture, thereby allowing use of different XMLRPC formats without changing other aspect of the device to device control architecture.

An Interface Fetcher comprising program code, is utilized by each of the devices *A* and *B* to fetch the device interface of another device directly from another device or from a home network Interface Library 80. When a device 14 is a controller device, a controller application program code 82 in

the controller device 14 effects command and control of other devices 14 over the network, by supervising software and hardware in the controller device 14 such as the XML parser 74, the interface fetcher 78 and the XMLRPC codec 76. When a device 14 is a controlled device, a controlled application program code 84 in the controlled device 14 supervises software and hardware in the device 14 for the device 14 to be controlled by other devices 14. A Home Network Device Web server 86 in each of the devices *A* and *B* manages communication between the devices over the network. An XML to Native Lookup Table 88 in each of the devices *A* and *B* is used by the controlled application 84 to convert information in XMLRPC messages (e.g., method name, parameters name and type) to native interface of the device (e.g., native method name, parameters name and type). Said table 88 is not used when the names of methods and parameters in XML messages and the native interface of the device are the same.

Each of device the devices *A* and *B* further includes one or more Handlers 90, wherein each Handler 90 includes a pointer from within the controlled application 84 to a native implementation of one specific device functionality. In most devices, native implementations of device functionality include binary code at run-time. The binary code can be generated from higher level languages at compile time, including C and Java, for example. As such, consumer electronics manufacturers can add more Handlers 90 for new functions without affecting existing Handlers and function implementations. A hardware service 92 in each of the devices *A* and *B* includes native implementations of device functions. Each of the devices *A* and *B* also includes a Native Interface 94 which comprises the API of native implementation of the device functions.

Further, a Network Object Request Broker such as a Home Network Object Request Broker (HNORB) 79 and Interface Library (IL) 80 provides a middleware layer 98 for the home network 10. As shown in Figure 19, the middleware layer 98 can be located in a third device 96 or in a separate

control hub. The HNORB 79 includes a software agent for use by one device 14 to discover the existence of other devices 14 connected to the network 10. The HNORB software agent organizes device names into a naming hierarchical tree structure, organizes device interfaces into said searchable Interface Library, and provides device interfaces to a device requesting interface information.

The middleware layer, comprising the HNORB 79 and the IL 80, can be connected directly to the Internet, such that selected home devices can be accessed from outside of a local home network 10. The middleware layer 98 in one local home network can be connected to the middleware layer 98 in other local home networks over the Internet to provide an integrated network comprising two home networks 10. In that case, authorized users with the appropriate stream encryption can access a DVD changer in the user's primary home, from a TV in the user's secondary home to play a video and view it on the TV.

To use the Interface Library 80, at least one HNORB&IL should be running on the local home network 10. More than one HNORB&IL may also be available. For example, a cable modem, several DTVs, and a central home hub can all have their own HNORB&IL software agents. To locate the HNORB&IL, a device 14 sends a broadcast message over the local home network. The first HNORB&IL to respond to the device 14 is utilized by the device 14. Once a HNORB&IL is located, the device 14 and the HNORB&IL can establish a point-to-point Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) connection for registration, interface request and fetch, and device lookup services. If a UDP protocol is not available, a TCP protocol can be used for high bandwidth connections such as IEEE 1394. HTTP-based XMLRPC can also be utilized for device to HNORB&IL communications. For example, a device 14 can remotely call a "register" method of HNORB to pass the device interface as one or more parameters, or, a XMLRPC call can retrieve a partial or entire device interface from the IL

as a XMLRPC response or return value.

As aforementioned, more than one HNORB&ILs can run in a local home network 10 simultaneously, wherein each HNORB&IL recognizes a subset of available devices and one HNORB&IL can communicate with other HNORB&ILs to locate the devices 14 it can not find. Multiple HNORB&ILs on one local home network 10 can locate each other automatically by using broadcasting messages, such as UDP or TCP. In this case, multiple HNORBs construct a distributed object request broker, while multiple Interface Libraries 80 construct a distributed interface library. To provide fault tolerance, if one of the HNORB&IL should terminate unexpectedly, all devices registered with this HNORB&IL are notified and said devices can automatically register with another available HNORB&IL.

Each device interface has an associated consistent, unique logical name. Other devices can use said consistent, unique, logical name to recognize and access a device, even after said device's location or real network address has changed. The mapping of the logical names and real device addresses are handled by a software agent for naming service in HNORB. Preferably, a standardized naming method is utilized. More preferably, a hierarchical naming structure is used to organize device names into a hierarchical tree. This hierarchical structure can be expressed using "/", similar to that in a file system. The structure can be generated by different methods, such as by different service types as a home/MPEG2/TV; or by different locations, such as home/livingroom/VCR. Several naming trees may coexist for performance and efficiency.

In the example command and control between the controller server device *A* and the controller server device *B* in Figure 19, the middleware layer 98 is in the third device 96 or can be in a separate central hub. The grayed blocks show the device elements used for the specific command and control process depicted in Figure 19. In an example operation scenario, after the

devices *A* and *B* become available and accessible over the network, each device registers/submits itself and its XML interface to the central HNORB and IL middleware layer 98. If a central HNORB and IL middleware layer is not available, then each device broadcasts a message over the local home network to announce itself.

The controller application 82 of the device *A* attempts to query all or part of the device interface of the controlled device *B*. If an Interface Library 80 is not available, the controller device *A* can request and fetch the device interface of the controlled device *B* directly from the controller device *B* by first sending a request to device *B* over the network, and then receiving the XML interface of device *B* from the device *B*. However, if an Interface Library 80 is available, the controller device *A* can request all or part of the device interface of the controlled device *B* from the Interface Library 80. The software agent of HNORB obtains the XML device interface of the device *B* from the Interface Library 80 structure and sends it back to the controller device *A*.

Once the controller device *A* receives the XML device interface of the controlled device *B*, the controller application of device *A* uses the XML parser 74 of device *A* to parse and interpret the device interface of the device *B*. The XMLRPC codec 76 of device *A* then generates desired XMLRPC command messages using the parser results. The XMLRPC command messages are sent to the controlled device *B* over the network. Upon receiving said XMLRPC command messages, the controlled application 84 of device *B* uses the XML parser 74 of device *B* to parse and interpret the received XML command messages. The XMLRPC codec 76 of device *B* then decodes the parser results to obtain the method call information in the command message, including a method name and parameters for the device *B* functions to perform requested services.

The controlled application 84 of device *B* then uses the XML to Native Lookup Table 88 and Handlers 90 in the device *B* to access and launch the

native function implementations of device *B* through the native interface of device *B*. If a function generates any responses or return values, said responses or return values are encoded into XML or XMLRPC messages and sent to the controller device *A*. Further, the middleware layer HNORB and IL can provide the controller device *A* with a reference to the controlled device *B*, whereby the device *A* can generate remote calls to the device *B* native functions just as calls to the local device *A* native function.

Preferably, a standard XMLRPC format is utilized so that all devices can interpret and decode RPC calls over the network. Because the device interface of a controlled device 14 can be queried and examined by a controller device 14, preferably a simplified XMLRPC format with sufficient device interface information is utilized to improve efficiency. The following example shows two possible formats of XMLRPC calls for One Touch Record (OTR) and Time Delayed Record (TDR) operations.

EXAMPLE I:
XML RPC call, example format including detailed tag and interface information:

1. Example of OTR call:

```
<?xml version="1.0"?>
<call>
        <object>DVCR1.record</object>
        <method>timeDelayedRecod</method>
        <parameters>
<parameter>
                <name>channel</name>
                <value><int>4</int></value>
</parameter>
<parameter>
                <name>recordTime</name>
                <value><time>2:10:30</time></value>
</parameter>
        </parameters>
</call>
```

2. Example of TDR call:

```
<?xml version="1.0"?>
<call>
        <object>DVCR1.record</object>
```

```
        <method>oneTouchRecod</method>
        <parameters>
    <parameter>
                    <name>channel</name>
                    <value><channelName>NBC</channelName></va
                    lue>
    </parameter>
    <parameter>
                    <name>startTime</name>
                    <value><datetime.iso8601>19990401T19:05:35</
                    datetime.iso8601></value>
    </parameter>
    <parameter>
                    <name>recordTime</name>
                    <value><time>2:00:00</time></value>
    </parameter>
        </parameters>
    </call>
```

EXAMPLE II:

XML RPC call, example format with reduced tags and interface information:

1. Example of OTR call:

```
<?xml version="1.0"?>
<call>
        <object>DVCR1.record</object>
        <method>timeDelayedRecod</method>
            <parameter value="4">channel</parameter>
            <parameter value="2:10:30"> recordTime </parameter>
</call>
```

2. Example of TDR call:

```
<?xml version="1.0"?>
<call>
        <object>DVCR1.record</object>
        <method>oneTouchRecod</method>
            <parameter value="NBC">channel</parameter>
            <parameter
            value="19990401T19:05:35">startTime</parameter>
            <parameter value="2:00:00">recordTime</parameter>
</call>
```

Referring to Figure 20, device interfaces for home devices 14 are based on an industry standard structured data base 100 using standardized vocabulary. Interface data for new interfaces and vocabulary can be added to the data base 100. A comprehensive definition or database of CE objects, methods and parameters using English words to describe all CE devices is

termed a CE data base 102. The comprehensive definition or database can be in C, XML or other formats capable of representing objects and their respective methods and parameters. The comprehensive definition or database utilizing standardized XML vocabularies is termed XCE definition or data base 104.

Controller and controlled applications 82, 84 are programmed using a standard interface subset of the XML based XCE data base 104. Each device interface is stored with said applications 82, 84 in XML form. Although the XCE data base 104 need not be in XML, said subset interface produced at compile time is in XML in an embodiment of the invention, as described above in reference to Figure 15.

In Figure 20, for embedded appliances 14, the information designated as 'Manufacturer' information is built-in to the appliances 14 at manufacture time, and the information designated as 'Home Network' is part of the operational run time aspects of the appliance in the network. Device XML interfaces 72 designated as *1 ... N* for *N* devices 14, are branches of the data in a standardized XCE data base 104. A Home Network Interface Library (HNIL) 106 provides a collection of the device interfaces of available devices 14 connected to the home network. The Home Network Interface Library 106 is a subset of the totality of the XCE data base 104.

In Figure 16, a device interface was transferred from a device *A* to a device B for an *Application B* in device *B* to examine the contents of the interface for the device *A*. As detailed above, a device interface includes a description of the objects, methods, parameters supported by a device, and is referred to as INTERFACE-A.XML for a device *A* for example. A Device XML interface 72 is a device interface in XML format. The content of the XCE data base 104 is a service oriented structure which provides device interfaces.

Referring to Figure 20, the XCE database 104 also includes a standardized XCE Interface Document Type Definition (DTD) for CE devices, which provides a standardized set of rules for using XML to represent CE devices 14. The DTD or its subsets can be used for validity checks. A software agent designated as Manufacturer Tool 108, filters and utilizes a subset of the standardized XCE definition 104 for a specific CE device, and uses the standardized XCE Interface DTD to generate an XML device interface 72 of the CE device, for example INTERFACE.XML and INTERFACE.DTD. The document INTERFACE.XML includes a description of the objects, methods and parameters supported by a specific device according to the standardized XCE Interface DTD. The document INTERFACE.DTD is a subset of the standardized XCE Interface DTD, and can be used for validity check for the XML interface of the device. Other document type definitions can also be used to create the INTERFACE.XML document.

The XML interfaces 72 of the CE devices, including said XML interface document and said DTD document, are stored in a universally accessible library such as the home network Interface Library 106. A software agent 110 collects the device interfaces 72 of all accessible devices 14 over the network and places them into the searchable structured Interface Library 106 along with the device name/address information. The Interface Library 106 is a subset of the XCE database 104 and the process of generating the Interface Library 106 is similar to that of rebuilding part or all of the XCE database 104. The Interface Library 106 can function as a collection of device interfaces 72 of all devices 14 in the home network, or as a cache depending on availability of storage space, wherein only the most recently used device interfaces 72 are stored therein. In cases where a device 14 updates its device interface 72 due to an event, such as disk change in a DVD player, part of the device interface 72 is updated based on an event service.

Referring to Figure 21, preferably the device interface definition 72 of

each device 14 has a hierarchical form. This is because for a home device 14, the device interface definition 72 can be lengthy. Typically, one or few functions such as a single function for Time Delayed Recording, are accessed at a time, and therefore only a small portion of the device interface 72 is used. Rather than rendering the entire device interface 72, it is more efficient to render only a portion of he device interface 72. By using hierarchical device XML interface, a controller device 14 can request partial device interface 72 of a controlled device 14 by specifying the desired function categories or functions in a request for the XML device interface from the controlled device 14 or from the HNORB and IL middleware layer 98. In the latter case, the HNORB and IL middleware layer 98 sends back the desired portion of the device interface 72.

Referring to Figure 21, the hierarchical device interface structure can include four layers, including: (1) a first layer 112 for XML interface of each home network, listing current available devices, (2) a second layer 114 for general XML interfaces of each device, listing function categories, (3) a third layer 116 for specific XML interface of each function category for a device, and (4) a fourth layer 118 for specific XML interface of each function in a function category. Inside the home network, only the three lower layers 114, 116 and 118 are utilized, and outside the home network the first layer 112 is utilized.

Figure 22 shows said layers 112, 114, 116, 118 and corresponding interface examples. The interface in each layer is linked to upper or lower layer (if available) through links such as XLink or XPointer, which provide two-way linking. XLink includes a package of hyperlinking functionality that has two parts: (1) an XLink component which allows links in an XML documents to be recognized as such, and (2) an XPointer component which allows links to address into precise sub-parts of an XML document. As such, XLink governs how links are inserted into XML documents, wherein the link may point to data such as a GIF file. Further, XPointer governs a fragment identifier that

can go on a URL when linking to an XML document, from anywhere (*e.g.*, from an HTML file).

In a typical command and control model for a server device 14 to control another server device 14 according to the present invention, a first device 14 attempts to query the device interface of a second device 14 at the second interface layer 114. After selecting function categories (FC), the first device 14 queries the interface layer 116 of a specific function category in the second device 14, such as Record Category. Further, the first device 14 can query the interface layer 118 of a specific function, such as OTR or TDR, to make calls to said functions. The hierarchical or tree structure makes finding of an interface function more efficient and saves network bandwidth. An example interface file structure and layers can be:

First layer 112 - HN1.xml
Second layer 114 - VCR1.xml
Third layer 116 - VCR1_RecordCategory.xml
Fourth layer 118 - VCR1_RecordCategory_OTR.xml

Similarly, the home network Interface Library 106 is preferably hierarchical and can be structured in a variety of ways such as by different service type of devices or by different locations such as rooms. Said hierarchical structure is the interface of a local home network 10 to other home networks or the Internet.

An example hierarchical device interface definition 72 which can be implemented in XML syntax is shown below.

```
consumer (document_file, doc)
    +----document_file<server_home.dtd, server_auto.dtd>
    +----doc (services_home, server_auto, server_samsung_web_site,
avc_commands, cal_commands,,)
        +----services_home (xml_utility, client, server_av, lighting,
comms, hvac, utility, security, appliances, convenience,,)
        +----xml_utility (download_DTD_file,,)
        +----client (acknowledge, attention, error, post_message,
sound, stop_schedule, stop_all,,)
```

```
          +----sound (alarm, ring, buzz,,)
       +----server_av (controls_gen, source, sink)
          +----controls_gen (ping, process_infor, setup,,)
             +----process_info (s/w_id, h/w_id)
                +----h/w_id (ser_no, manuf, model, class,,)
                +----s/w_id (ser_no, exe_name, version,,)
             +----setup (clock,,)
                +----clock (hours, minutes, seconds)
          +----source (service_id, media, rate, protocol,
stream_format, controls_av,,)
          +----sink (service_id, media, rate, protocol, stream_format,
controls_av,,)
             +----service_id (url,,)
             +----media (tpt_stream, ram, disk, tape,,)
                +----disk (name, number,,)
             +----rate<value>
             +----protocol (61883/1394, UDP/IP/Ethernet,,)
                +----61883/1394 (isoch_ch_no)
             +----stream_format (video, audio,,)
                +----video (dv, mpeg2tpt, dsstpt, mpeg2pes,
mpeg10801-tpt,)
                +----audio (mpeg3, ac-3, midi,,)
             +controls_av (flow_control, tune, timer_record,
ui_control,,)
                +----timer_record (tune, flow_control)
                   +----flow control (play, stop, goto, record,,)
                      +----play (time_params)
                      +----record (time_params)
                         +----time_params (now, start, duration, end,,)
                +----tune (send_epg, channel,,)
                   +----channel (number, id, time_params,,)
                   +----ui_control (display, acoustic)
                   +----display (brightness, contrast, color/tint,
horiz_size, vert_size,,)
                      +----acoustic (volumn, base, treble, balance, fade,)
       +----lighting (sensors, lights, send_epg)
          +----sensors (living_room, sky,,)
          +----lights (rooms_up, rooms_down, yard,,)
             +----rooms_up (bed1, bed2, bed3, bed4,,)
                +----bed1 (lamp, dimmer,,)
                   +----dimmer<value>
             +----rooms_down (family, kitchen, living, dining, soho,
garage,,)
             +----yard (front, back)
       +----comms (homehub, intercom, telco,)
          +----homehub (send_device_list, send_configuration,
send_snmp_mib,,)
          +----intercom ()
          +----telco ()
       +----hvac (controls_gen, controls_havc,,)
          +----controls_hvac (a/c, heat, temp, humidity,)
             +----temp (low, high, hysteresis,,)
       +----utility (meters, energy_mgmt,,)
          +----meters (water, gas, electric,,)
             +----water<value>, gas<value>, electric<value>
```

```
      +----security (sensors, send_epg, alarm,,)
          +----sensors (peripheral, motion,,)
             +----peripheral (rooms_up, rooms_down,,)
             +----motion (room_down, yard,,)
       +----appliances (microwave, range, oven, fridge, freezer,
coffee, toaster, washer, dryer, water_heater,,)
          +----microwave (send_epg, controls,,)
          +----fridge (temp,,)
          +----water_heater (temp)
       +----convenience (window, curtain_open, door/gate, pool/spa,
bath, fountain, lift, jacuzzi,,)
          +----curtain_open<value>
       +----server_auto (message, server_auto_ford_explorer_98,,)
          +----server_auto_ford_explorer_98 (mileage, maintenance,,)
       +----mileage <data>
       +----maintenance <data>
    +----server_samsung_web_site (message, service, help,,,)
    +----avc_commands<,,,command_string,,,>
       +----service_id url,,)
    +cal_commands<,,,command_string,,,>
       +----service_id (url,,)
```

Said hierarchical device interface definition 72 can include the following fields:

'document file' name, provides name of the document type definition (DTD) file that can be used by an XML parser 74 for verification of legality and correctness of the XCE database 104 or part of the XML version of the XCE database 104. There can be several DTD files for different parts of the XCE structure, wherein said DTDs are different from the document type definitions for the RPC.CALL and INTERFACE.DTD for communication.

'doc' name, provides the top level name of the area of coverage of capabilities, attributes, communication and control interface.

'Services_home', provides area for home automation, consumer electronics, utility, etc.

'Server_auto', for an automobile in the garage and shows message interface available for one or more automobile types. For example, server_auto_ford_explorer_98' is the interface for a particular automobile. This allows access to mileage and maintenance interfaces of the automobile, and can also be used for remote access by an automobile manufacturer or garage for direct checking and remote diagnostics, for example.

'server_samsung_web_site', provides for communicating with a manufacturer Web site outside the home. Includes interface for message,

service, help, etc.

'AVC_commands' and 'CAL_commands', provides for legacy devices capable of interpreting AV/C and CAL languages, for example. This portion of the structure identifies commands in said languages, where the commands are tagged and carried in XML. As such, the contents are not XCE (Web) objects, and protocol converter applications can be utilized to interface to the original CAL or AV/C application software.

In the above description, 'Services_home' provides the main structure including A/V consumer electronics. A branch of the structure is expanded in detail for a particular example of a video services sink, and stream destination (e.g., DVCR) control interface. The control interfaces in a typical home network can include:

'xml_utility', provides details for supporting utility network functions such as downloading an updated DTD file, interface file, program file, etc.

'client', describes the interface details of a client device 12 including a Web browser. For example 'acknowledgment' indicates the controller's acceptance of acknowledgment of a message or command sent out.

'server_av', provides control and capacity interfaces for all audio and video services available, including STB, DVCR, DTV, DVD, AUDIO, etc.

'lighting', provides an interface to a home automation lighting controller, and includes sensors, lights, etc.

'comms', provides control interfaces to communications devices, typically for utility purposes or remote management of the devices' set-up or parameters, or for restoring configurations.

'hvac', provides interfaces for remote control of the HVAC system, and can be used for control of said system from outside the home by the utility company, for example, to turn the home's HVAC system off during peak load periods of the day. Further, said interface can be used for controlling the HVAC system from within the home, by an appliance for device

based controller to provide a more sophisticated control mechanism than thermostat control.

'utility', provides interface for reading utility meters for the home, for example.

'security', provides interface for security sensors and alarm settings. As such, using the interface, applications running on a home network device can have access to the sensor and detector devices around the home for monitoring and controlling of the those devices.

'appliances', provides interfaces for kitchen, utility and general home appliances, including, for example, providing remote control or monitoring temperature settings or other controls and parameters from a controller device. In one scenario, a microwave appliance can scan bar code information on the packaging of a food item and access a manufacturer database to obtain cooking time of the food for a given microwave system type. Such integration of appliances using device to device command and control provides many control scenarios for providing services such as automatically pausing a dishwasher and muting a TV when a phone is picked up in the kitchen or family room.

'convenience', provides interfaces to devices for providing convenience services such as interface to a curtain, window, blinds or whirlpool controllers, for example.

In the above description, 'server_av' is part of the structure for the control interfaces for A/V appliances offering A/V stream service, and is subdivided into 'controls-gen', 'source' and 'sink' capabilities.

'controls-gen', provides interface for device manufacturer attributes and general utility interfacing such as ping testing the presence of the device. Further, manufactured-in attributes such as software and hardware identification and version information can also be included. A device supplying this interface returns data providing name or identification for said software without effecting any control actions. An interface to set the time of day clock can also be included.

'sink', provides interface for the media stream service devices.

The structure is organized based on service offered (i.e. video stream record and replay) rather than particular device names such as VCR. For example, a Tuner and a DVD player are both video program stream sources for the network with video program formats, and can be controlled, such as started and stopped. Differences in control of particular devices are addressed by the lower layers of the definition structure.

'source' provides interface similar to the 'sink' interface.

Referenced above, 'service_id' or 'application_interface_id' includes the name, address or Web address or URL location of one or more devices 14. Because the XCE database 104 comprises the totality of agreed upon interfaces, typically a Dynamic Host Configuration Protocol (DHCP) software agent executes to assign an address and a default name to each device, and the address and a default name are added the interface of the service or device. The software agent 110 then collects device interfaces 72 which include subset or 'device partial XCE' definitions from all the devices locally connected to the home network to generate a 'network partial XCE'. Additional relevant external interfaces can be added to the structure for external control. For example 'service_id' can be a name/address in a received structure or in a network Interface Library 106 including entries from the software agent according to the device interfaces of the devices connected to the network. Thereafter, a user can search for a service in the database and access an application whose interface includes a particular data branch of the library using said name/address. As such, the network can include multiple identical services distinguished by said name/address information.

'media', provides interface for the type of media including, for example, transport stream from a tuner, RAM from a PC DRAM, disk for CD or DVD, and tape. The media can be named and identified, and a controller device can search the XCE data base to identify the media currently provided on the network. When a new media such as DVD disk is provided on the network,

that portion of the device interface 72 identifying the program material on the disk is changed accordingly. As such, the entire device interface 72 need not be transferred and only the relevant portion is transmitted to the XCE data base. On receipt of an attention signal, the library software agent 110 can fetch the new update and place it in the proper place in the interface library 106. The addition of the disk media is similar to adding a service to the network or connecting another appliance to the network.

'rate', provides a value for data stream rate for a device interface, such as 6 Mbits/Sec or 19.2 Mbits/Sec, for example.

'protocol', identifies the protocol used for said data stream. If more than one protocol is provided, for example 61883/1394 or UDP/IP, then a desired protocol can be selected.

'stream_format', provides packet format and/or compression standard for digital stream audio and video split. If more than one format is provided, a desired format can be selected via an interface message. A controller application 82 can examine the available formats to determine if there are compatible ones.

'controls_av', provides the main control interface for A/V media appliance.

'Flow_control', provides data stream controls such as: PLAY, STOP, GOTO, RECORD, etc as methods for a particular device. The methods do not change for embedded appliance, except for PC software, for example. The controls can include time parameters for delayed operation.

'Tuning', provides interface for tuning control. A controller device 14 can send a request to the interfaces of a controlled device 14 to send back an Electronic Program Guide (EPG) data structure described above.

'UI control', provides control interface to a controlled application 84 to control adjustments for display such as brightness and contrast, and for audio, such as volume and bass.

'Timer_record' provides interface for set-up data for a controller application 82 to implement delayed time recording. Direct channel tune information and flow control (time_aparams) information can be utilized.

The above description can apply equally to client devices 12. An alternative syntax XCE definition or database for the CE space can be utilized. The alternative syntax XCE data base includes full service descriptions including home automation, appliances and automobile, for example. In cases where a service object provides flexibility and parameters for control, a control method is utilized to control the object as desired. Example commands in the AV/C and CAL command languages including binary and hex data strings are shown below.

```
consumer (document_file, doc)
     +----document_file<server_home.dtd, server_auto.dtd>
     +----doc (avc_commands, cal_commands, services_home,
server_auto,
server_samsung_web_site, server_auto_ford_explorer_98,,)
          +----avc_commands<...command_string...>
          +----cal_commands<...command_string...>
          +----services_home (client, av, lighting, comms, hvac,
utility, security,
appliance, convenience,,)
               +----xml_utility (download_DTD_files,,)
               +----client (acknowledge, attention, error,
post_message, sound,
stop_schedule, stop_all,,)
                    +----sound (alarm, ring, buzz,,)
               +----server_av (source, sink)
                    +----source (service_id, media, rate, protocol,
stream_format,
controls_gen, controls_av,,)
                    +----sink (service_id, media, rate, protocol,
stream_format,
controls,,)
                         +----service_id (url,,)
                         +----media (tpt_stream, ram, disk, tape,,)
                              +----disk (name, number,,)
                         +----rate<value>
                         +----protocol (61883/1394,
UDP/IP/Ethernet,,)
                              +----61883/1394 (isoch_ch_no)
                         +----stream_format (video, audio,,)
                              +----video (dv, mpeg2tpt, dsstpt,
mpeg2pes,
mpeg1080i-tpt,)
                              +----audio (mpeg3, ac-3, midi,,)
                         +----controls_gen (ping, process_info,
setup,,)
                         +----controls_av (flow_control, tune,
timer_record,
ui_control,,)
                              +----process_info (s/w_id, h/w_id)
```

```
                                        +----h/w_id (ser_no, manuf, model,
class,,)
                                        +----s/w_id (ser_no, exe_name,
version,,)
                                   +----setup (clock,,)
                                        +----clock (hours, minutes,
seconds)
                                   +----time_record (tune, flow_control)
                                   +----flow_control (play, stop, goto,
record,,)
                                        +----play (time_params)
                                        +----record (time_params)
                                   +----tune (send_epg, channel,,)
                                             +----channel (number, id,
time_params,,)
                                                  +----time_params (now,
start, duration, end,,)
                                   +----ui_control (display, acoustic)
                                        +----display (brightness,
contrast,
color/tint, horiz_size, vert_size,,)
                                        +----acoustic (volume, bass,
treble,
balance, fade,)
                         +----lighting (screen, light, send_epg)
                         +----sensors (living_room, sky,,)
                         +----lights (rooms_up, rooms_down, yard,,)
                              +----rooms_up (bed1, bed2, bed3, bed4,,)
                              +----rooms_down (family, kitchen, living, dining,
soho,
garage,,)
                              +----yard (front, back)
                                   +----bed1 (lamp, dimmer,,)
                                        +----dimmer<value>
                         +----comms (netman, intercom, telco,)
                              +----netman (send_device_list,
send_configuration,
send_snmp_mib,,)
                              +----intercom ()
                              +----telco ()
                         +----hvac (controls_gen, controls_hvac,,)
                              +----controls_hvac (a/c, heat, temp, humidity,)
                                   +---temp (low, high, hysteresis,,)
                         +----utility (meters, energy_mgmt,,)
                              +----meters (water, gas, electric,,)
                                   +----water<value>,  gas<value>,
electric<value>
                         +----security (sensors, send_epg, alram,,)
                              +----sensors (peripheral, motion,,)
                                   +----peripheral (rooms_up, rooms_down,,)
                                   +----motion (rooms_down, yard,,)
                         +----appliances (microwave, range, over, fridge,
freezer, coffee, toaster,
washer, dryer, water-heater,,)
                              +----microwave (send_epg, controls,,)
```

```
                    +----fridge (temp,,)
                    +----water-heater (temp)
               +----convenience (window, curtain_open, door/gate,
pool/spa, bath,
fountain, lift,,)
                    +----curtain_open <value>
          +----server_auto (message, mileage, maintenance,,)
               +----mileage<date>
               +----maintenace<data>
```

In another aspect, the present invention provides for use of existing command language implementations for device-to-device command and control in a network. Devices can include internal objects and APIs which, at run time, create binary strings according to existing transport mechanisms. In that case, in order to provide XML remote procedure calls (XML RPC) from one device 14 to another device 14 in the network, the exiting application interface implementation is replaced with calls to the XML service API. As such, the original implementation is equivalent to a wrapper for the XML service API. Figure 18 also shows applications created using other command languages such as CAL or AV/C in dashed lines, with their interface implementations replaced with a wrapper in the XCE/XML service API. Examples for changing from CAL command language to XML RPC format are shown below.

```
-----------------------------------------------------------------------
existing implementation:

void DeviceCALCommand (int command) {
          .
          .
          /*
          create CAL formatted byte string to represent this
          object/method and output to the wire
          */
          CreatCALFormattedByteString(command);/*   different for
                                                every protocol */
          SendCALByteString();     /* different for every protocol
*/
}
-----------------------------------------------------------------------
wrapping the XML Service API call:

void DeviceCALCommand (int command) {
```

```
{
            /*
            replace CAL implementation with calls to the XML
ServiceAPI
            */
            CreateXMLMessage (command);    /* always the same */

            sendXMLMessage ();             /* always the same */
}
```

Referring to Figure 23, in another aspect, the present invention provides a standard command protocol and control language translation for inter-device communication between disparate devices in a network. For different devices to share information, the information must be in a format that a requesting device can interpret. And, for a device 120 to control another device 22, the two devices must use a common language in order to interpret one another's commands. The present invention provides a common identification format for data and command protocols.

In one embodiment, a method of common presentation or packaging of data and command protocol is provided, whereby a receiving device 122 can determine the native format of transmitted data. If the receiving device 122 can interpret that native format, then it can accept the data directly. Otherwise, the receiving device 122 can request a translator device 124 or application to translate the data into a desired format which the requesting device 122 can interpret. The translator device 124 or application determines the native format of the original data, translates the data into said desired format, and sends the translated data to the requesting device 122.

The requesting device 122 then processes that data as though the data had originally been provided in the requesting device's native language format by the sending device 120. The requesting device 122 can also send a response back to the sending device 120 in the requesting device's native format, or send a response by proxy through the translator device 124 or application for translation into the native format of the sending device 120. The translation method can be utilized for information including command

protocols, data files and audio/video streams.

For devices that do not utilize the common format described above, the present invention provides for translation of data including command protocols to, and from, such non-compliant devices. For example, when a non-compliant device 120 sends data to a compliant device 122, the compliant device 122 can translate the data based on a determination of the native format of the data. For example, the compliant device 122 can examine the data for particular bit patterns within the data. When a compliant device sends data to a known non-compliant device, the compliant device can translate the data before transmission based on a determination of the native format of the non-compliant device.

An example implementation can be for a home network which supports the IP and HTTP protocols. The home network can be connected to the Internet to obtain applications and services of various types for desired functionality. As such, the common format method can be made compatible with Internet protocols and procedure for operation over the Internet and the home network.

One example of providing a common data format is utilizing XML to create a package for the data for transmission over the home network. The data can include command protocol, streaming audio or video, graphics or applications. The data is 'wrapped' with a standard header identifying the native format of the data and contents of the package, in XML form. The header allows unique identification of the data type the data portion of the XML code, whereby the data can be translated if necessary and provided to appropriate applications upon receipt.

Under the Web standard, the identification process is performed by browsers using file name extensions to identify the type and contents of a file transmission. The browsers then launch appropriate plug-in modules to

process the file. In the home network, XML is utilized to identify data transmissions which provides all home network transmissions over IP with a common identification method as described above.

Alternatively, a software layer can be provided in the home network protocol stack to uniquely identify the contents of all data transmissions over the home network. The software layer can be used instead of XML. The common format and identification principles of the present invention apply equally in either embodiment using XML or said software layer as identification methods.

In Figure 23, upon receipt of a data package transmission, the receiving device 122 examines the XML identity header of the data package to determine the format of the data therein. If the data is in a format recognizable by the device 122, the XML identity header information is discarded and the device processes the data directly. Otherwise, the device 122 converts the received XML package into an XML translation request package and sends the request package and the data to the translation server device 124.

The translation server device 124 translates the data and converts the translated data into an XML translation response package. The translation server 124 then transmits the response package back to the requesting device 122. In case of a translation error, the translation server 124 can provide a translation response error condition to the requesting device 122. Upon receiving the translated data, the requesting device 122 processes the translated data in the response package.

Example of an XML data package or packet can be:
<IDENTITY type=format=AV/c>...packet data ...<\IDENTITY>

Example of a translation request package or packet can be:
<TRANSLATION REQUEST type=Command format=CAL>
<IDENTITY type=Command format=AV/C>...packet data

...</IDENTITY>
<\TRANSLATION REQUEST>

Example of a translation request package or packet can be:
<TRANSLATION RESPONSE type=Command format=CAL>...packet data ...
<\TRANSLATION RESPONSE>

Example of a translation response error condition package or packet can be.
<TRANSLATION RESPONSE type=Command format=CAL>...packet data ...
<ERROR condition=Unrecognized command>Translation could not be performed<|ERROR>
<\TRANSLATION RESPONSE>

Further, Table 3 in Figure 24 includes a partial list of package or packet types and formats.

To provide translation services, a translation server 124 is identified in the network during network configuration in a manner similar to that of DHCP servers. The translation server 124 broadcasts its IP address to all devices in the network for a period of time after the network is configured. All devices 120, 122 compatible with the translation services store the IP address of the translation server 124 as it is broadcast over the network during network boot up.

Alternatively, the requesting device 122 can broadcast a translation request over the home network. All translation servers 124 in the network that receive the translation request can respond to the translation request by sending a translation response to the requesting device 122. The requesting device 122 then selects one translation server 124 among the responding translation servers. In one example, the requesting device 122 selects the first translation server 124 that responds to the translation request. In another example, the translation servers 124 can negotiate among themselves and/or with the requesting device 122 for the selection of a translation server 124 for satisfying the translation request.

In another embodiment of the invention, multiple translation servers 124 are utilized to fulfill all translation requests. For example, a single translation server 124 may not have the capability to translate all requests. In such cases, it is necessary to identify the address of each translation server 124 and the type of translation service each translation server 124 can provide. Each device 120, 122 can store a list of all translation server IP addresses and a corresponding list of the types of translation services each translation server 124 provides, and optionally the associated translation application.

For efficiency, if a sending device 120 wishes to send data to a receiving device 122 which is known to use a different native format than that of the sending device 120, the sending device 120 can send the data to the receiving device 122 by proxy through a translation server 124. The sending device 120 transmits a command to the translation server 124 similar to the translation request command and includes the address of the receiving device 122 as the destination for the translated data.

In cases where a receiving device 122 requires translation of a data stream, the sending device 120 can route the data stream directly to a translation server 124, and the translation server 124 in turn transmits the translated data to the receiving device 122 as described above. Alternatively, the sending device 120 can send the data stream to the receiving device 122, and the receiving device 122 then routes the data stream to the translation server 124 for translation and return of the translated data back to the receiving device 122.

In the description herein, the control mechanism is based on the Hypertext Transfer Protocol (HTTP 1.1) which provides an application-level protocol for distributed, collaborative, hypermedia information systems. HTTP is a generic, stateless, object-oriented protocol in wide use for many tasks. A feature of HTTP is the typing and negotiation of data representation, allowing

systems to be built independently of the data being transferred. Preferably, the network protocol used by devices and applications on the home network is IP (Internet Protocol). However, other protocols can also be utilized.

Although the present invention has been described in considerable detail with regard to the preferred versions thereof, other versions are possible. Therefore, the appended claims should not be limited to the descriptions of the preferred versions contained herein.

What is claimed is:

1. A method for performing a service on a home network, the method comprising the steps of:

(a) connecting a first home device to the home network;

(b) connecting a second home device to the home network;

(c) providing a database including a plurality of application interface description data objects, each application interface description data object including information in a structured format for commanding and controlling of a home device by one or more other home devices connected to the network;

(d) the second home device accessing a first application interface description object for the first home device in the database;

(e) the first home device accessing a second application interface description object for the second home device in the database;

(f) sending control and command data from the first home device to the second home device utilizing said application interface description object for the second home device over the network; and

(g) sending control and command data from the second home device to the first home device utilizing said application interface description object for the first home device over the network;

whereby the first and second home devices perform said service.

2. The method of claim 1 wherein the structured format includes XML format.

3. The method of claim 1 wherein step (c) includes connecting a database device to the network, wherein the database device stores said database.

4. The method of claim 3 wherein:

(i) the first home device stores the first application interface

data therein;

(ii) the second home device stores the second application interface data therein; and

(iii) step (c) includes an initial step of forming said database by steps including querying the first and second home devices to transfer said application interface data for the first and second home devices to the database device.

5. The method of claim 1 wherein step (d) includes providing the first application interface description object for the first home device from the database to the second home device over the network.

6. The method of claim 1 wherein step (e) includes providing the second application interface description object for the second home device from the data base to the first home device over the network.

7. The method of claim 1 further comprising connecting three or more home devices to the network, wherein at least one home device accesses the database to query the application interface description objects of a plurality of home devices for sending command and control data to the plurality of home devices over the network.

8. The method of claim 1 wherein each application interface description object includes data in a structured format.

9. A network system for providing a service, comprising:

(a) a physical layer, wherein the physical layer provides a communication

medium than can be used by devices to communicate with each other;

(b) first home device;

(c) a second home device;

(d) a database including a plurality of application interface

description data objects, each application interface description data object including information in a structured format for commanding and controlling of a home device by one or more other devices connected to the network; wherein:

the second home device includes application control means for accessing a first application interface description object for the first home device in the database and sending control and command data from the second home device to the first home device utilizing said first application interface description object; and

the first home device includes application control means for accessing a second application interface description object for the second home device in the database and sending control and command data from the first home device to the second home device utilizing said second application interface description object;

whereby the first and second home devices perform said service.

10. The network system of claim 9 wherein the structured format includes XML format.

11. The network system of claim 9 further comprising a data base device storing said database.

12. The network system of claim 11 wherein:

(i) the first home device stores first application interface description object therein;

(ii) the second home device stores second application interface description object therein; and

(iii) said database base device forms said date base by querying the first and second home devices to transfer said first and second application interface description objects, respectively, to the database device.

13. The network system of claim 9 wherein the control application

means of the second home device obtains the first application interface description object for the first home device from the database.

14. The network system of claim 9 wherein the control application means of the first home device obtains the second application interface description object for the second home device from the data base.

15. The network system of claim 9 further comprising three or more home devices, wherein at least one home device accesses the database to query the application interface description objects of a plurality of home devices for sending command and control data to the plurality of home devices over the network.

16. The network system of claim 9 wherein each application interface description object includes data in a structured format.

17. The network system of claim 9 wherein the structured format includes XML format.

FIG. 1

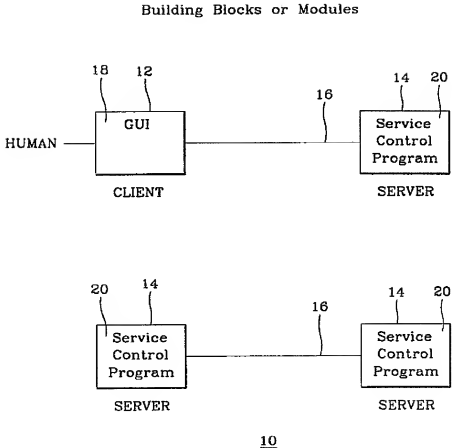

Building Blocks or Modules
18
12
14
20
16
HUMAN
GUI
Service Control Program
CLIENT
SERVER
20
14
14
20
16
Service Control Program
Service Control Program
SERVER
SERVER
10

FIG. 2

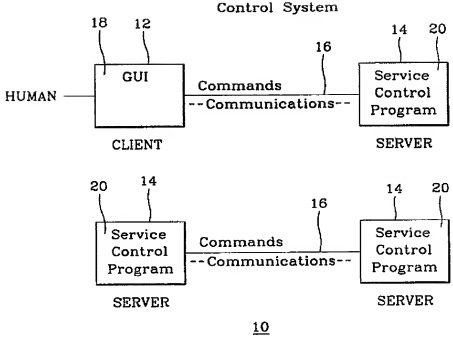

Control System
18
12
14
20
16
GUI
Commands
--Communications--
Service Control Program
HUMAN
CLIENT
SERVER
20
14
14
20
16
Service Control Program
Commands
--Communications--
Service Control Program
SERVER
SERVER
10

FIG. 3

Multiple Client Multiple Server Home Network Control Model

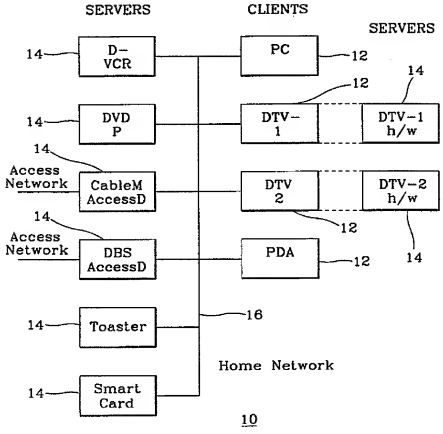


FIG. 4

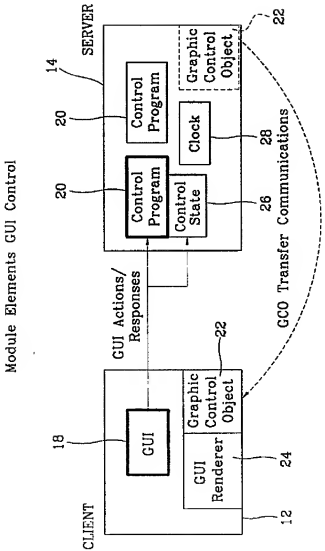

Module Elements GUI Control
SERVER
14
20
Control Program
Graphic Control Object
22
20
Control Program
Control State
Clock
26
28
GCO Transfer Communications
GUI Actions/ Responses
22
18
GUI
Graphic Control Object
GUI Renderer
24
CLIENT
12

FIG. 5

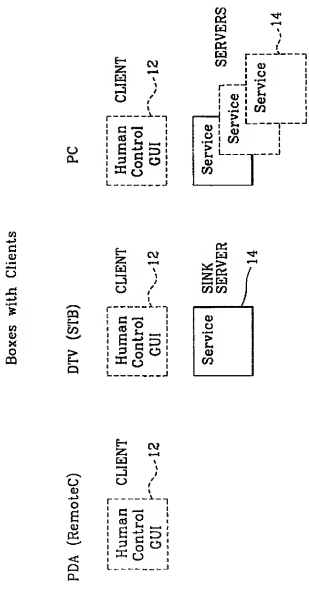

Boxes with Clients
PDA (RemoteC)
DTV (STB)
PC
Human Control GUI
CLIENT
12
Service
SINK SERVER
14
SERVERS
Service
Service
14

FIG. 6

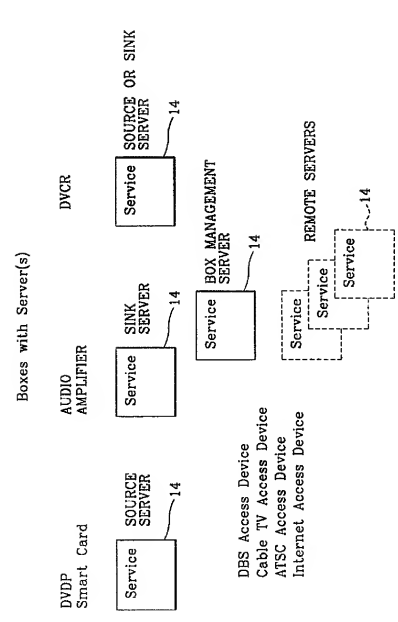

Boxes with Server(s)
DVDP
Smart Card
AUDIO
AMPLIFIER
DVCR
Service
SOURCE SERVER
14
Service
SINK SERVER
14
Service
BOX MANAGEMENT SERVER
14
Service
SOURCE OR SINK SERVER
14
DBS Access Device
Cable TV Access Device
ATSC Access Device
Internet Access Device
Service
Service
Service
REMOTE SERVERS
14

FIG. 7

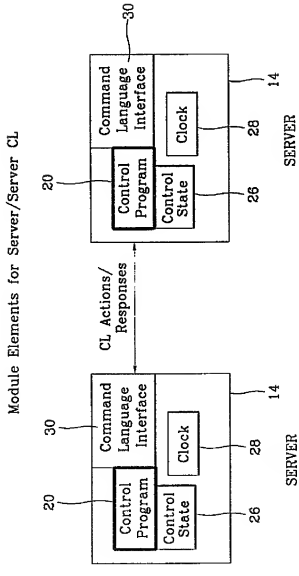

Module Elements for Server/Server CL
CL Actions/
Responses
Command
Language
Interface
Clock
Control
Program
Control
State
SERVER
14
20
26
28
30

FIG. 8

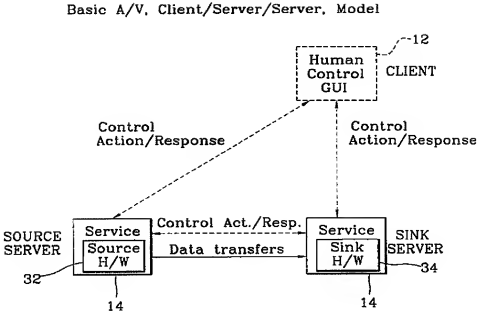

Basic A/V, Client/Server/Server, Model
12
Human Control GUI
CLIENT
Control Action/Response
Control Action/Response
SOURCE SERVER
Service
Source H/W
Control Act./Resp.
Data transfers
Service
Sink H/W
SINK SERVER
32
34
14
14

FIG. 9

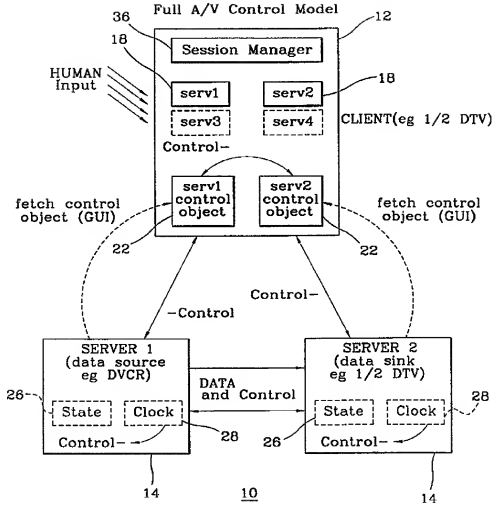

Full A/V Control Model
36
12
18
Session Manager
HUMAN Input
serv1
serv2
18
serv3
serv4
CLIENT(eg 1/2 DTV)
Control-
serv1 control object
serv2 control object
fetch control object (GUI)
fetch control object (GUI)
22
22
Control-
-Control
SERVER 1 (data source eg DVCR)
SERVER 2 (data sink eg 1/2 DTV)
DATA and Control
26
State
Clock
28
State
Clock
28
26
Control-
Control-
14
10
14

FIG. 10

Table 1: Capabilities Tavble

Service	Sink/Source
Service A	Sink
Service B	Source
Service C	Source
Service D	Sink

FIG. 11

Tavle 2: Attributes Table

NAME	LENGTH	VALUE
DeviceManufacturer	20 chars	Device manufacturer's name
ManufacturerURL	60 chars	Device manufacturer's home page URL
ManufacturerIcon	20 chars	Name of Device manufacturer's Icon
DeviceName	30 chars	Device name
DeviceModel	20 chars	Device model number
DeviceType	20 chars	Device category
DeviceLocation	30 chars	Device group or location
DefaultSource	15 chars	Data type, Default source device (IP address)
DefaultSink	15 chars	Data type, Default sink device (IP address)
DeviceIcon	20 chars	Name of device icon

FIG. 12

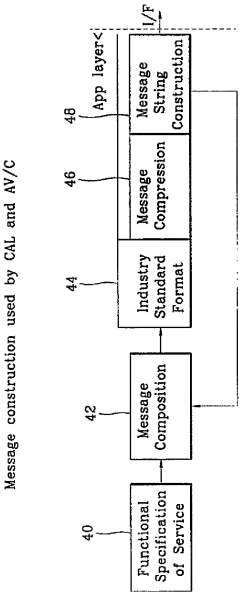

Message construction used by CAL and AV/C
40
Functional Specification of Service
42
Message Composition
44
Industry Standard Format
46
Message Compression
48
App layer
Message String Construction
I/F

FIG. 13

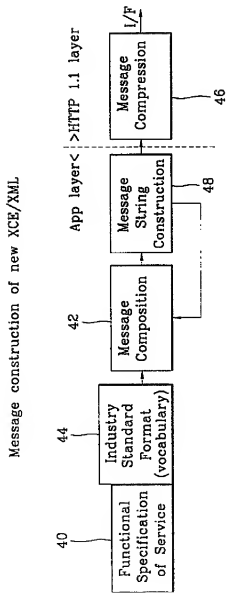

Message construction of new XCE/XML
40
Functional Specification of Service
44
Industry Standard Format (vocabulary)
42
Message Composition
App layer
Message String Construction
48
>HTTP 1.1 layer
Message Compression
L/F
46

FIG. 14

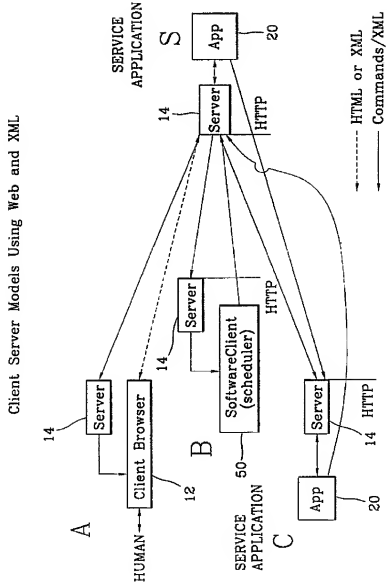

Client Server Models Using Web and XML
A
B
C
HUMAN
Client Browser
12
Server
14
SoftwareClient
(scheduler)
50
SERVICE
APPLICATION
App
20
HTTP
HTML or XML
Commands/XML

FIG. 15

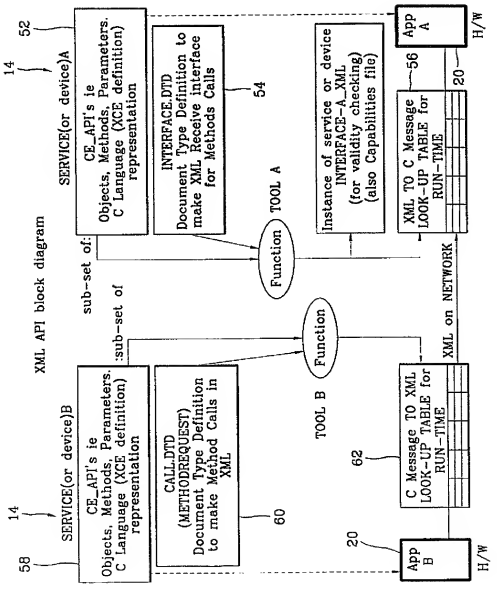

XML API block diagram
SERVICE(or device)A
CE_API's ie Objects, Methods, Parameters. C Language (XCE definition) representation
INTERFACE.DTD Document Type Definition to make XML Receive interface for Methods Calls
54
sub-set of:
Function
TOOL A
Instance of service or device INTERFACE-A_XML (for validity checking) (also Capabilities file)
XML TO C Message LOOK-UP TABLE for RUN-TIME
56
App A
H/W
SERVICE(or device)B
CE_API's ie Objects, Methods, Parameters. C Language (XCE definition) representation
CALL.DTD (METHODREQUEST) Document Type Definition to make Method Calls in XML
60
sub-set of
Function
TOOL B
C Message TO XML LOOK-UP TABLE for RUN-TIME
62
XML on NETWORK
App B
H/W
14
52
58
20

FIG. 16

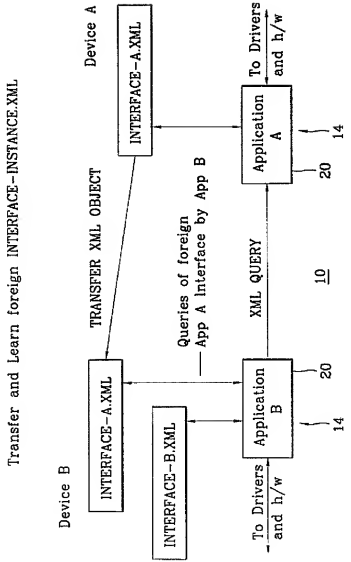
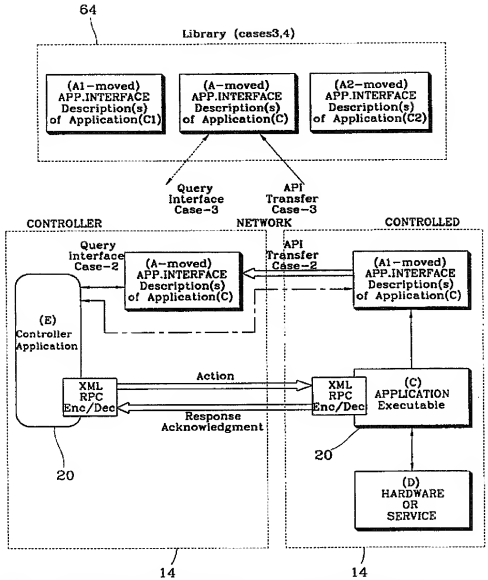

Transfer and Learn foreign INTERFACE-INSTANCE.XML
Device B
Device A
INTERFACE-A.XML
INTERFACE-B.XML
INTERFACE-A.XML
TRANSFER XML OBJECT
Queries of foreign
App A Interface by App B
XML QUERY
Application B
Application A
To Drivers and h/w
To Drivers and h/w
10
20
14
20
14

FIG. 17



Case 1. XML Application-C INTERFACE(A) for remote query by (E)
Case 2. Move XML Application-C INTERFACE(A) to controller for local query by (E)
Case 3. Move XML Application-C INTERFACE(A) to 3rd party device-a collecting place (library) for allinterface for remote query by (E). The library would have to have the address (URL) of the associated application available for direct control action and responses.
Case 4. is case 3 but the 'indirect' control action (and response) is also directed at the library device. In this case the library is built with a 'forwarder'

FIG. 18

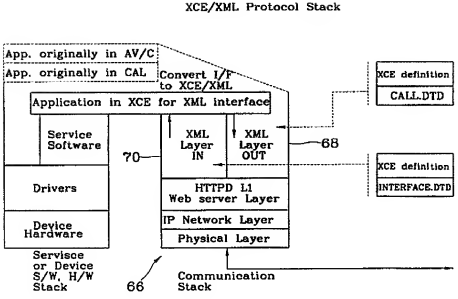
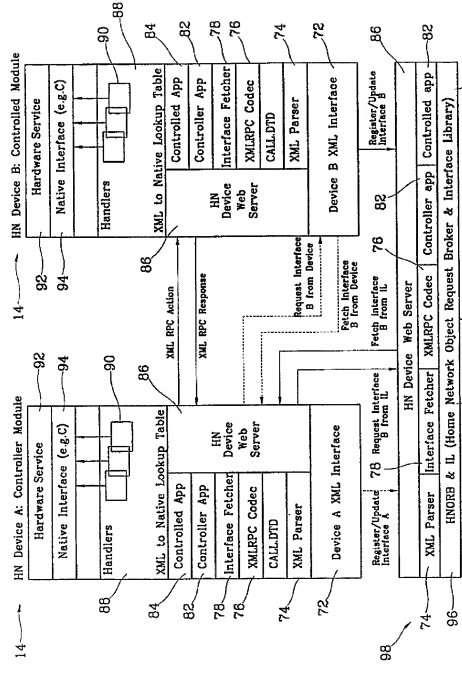

XCE/XML Protocol Stack
App. originally in AV/C
App. originally in CAL
Convert I/F to XCE/XML
Application in XCE for XML interface
Service Software
XML Layer IN
XML Layer OUT
70
68
Drivers
HTTPD L1 Web server Layer
IP Network Layer
Physical Layer
Device Hardware
Servisce or Device S/W, H/W Stack
66
Communication Stack
XCE definition
CALL.DTD
XCE definition
INTERFACE.DTD

FIG. 19



CALL.DTD describes the message format of XMLRPC output. It can be used by receiver of XMLRPC message for validity check.

10

FIG. 20

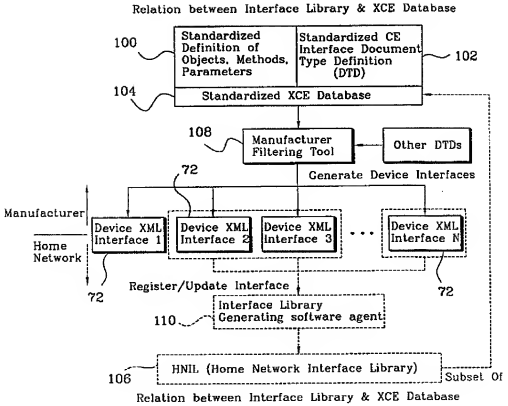
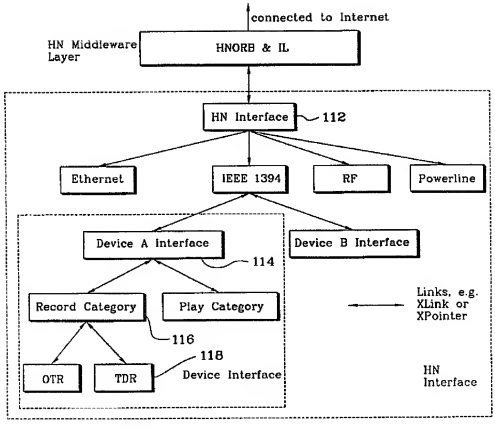
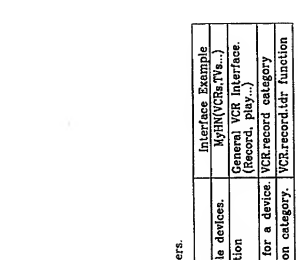

Relation between Interface Library & XCE Database
100
Standardized Definition of Objects, Methods, Parameters
Standardized CE Interface Document Type Definition (DTD)
102
104
Standardized XCE Database
108
Manufacturer Filtering Tool
Other DTDs
72
Generate Device Interfaces
Manufacturer
Home Network
Device XML Interface 1
Device XML Interface 2
Device XML Interface 3
Device XML Interface N
72
Register/Update Interface
72
110
Interface Library Generating software agent
106
HNIL (Home Network Interface Library)
Subset Of
Relation between Interface Library & XCE Database

FIG. 21



Example of Hierarchical IL & Device Interface

FIG. 22



Hierarchical Interface Structure. Four layers.

	Layer	Interface Layer	Interface Example
112	1	XML interface for each HN, listing current available devices.	MyHN(VCRs,TVs...)
114	2	General XML interface for each dvice, listing function categories.	General VCR interface. (Record, play...)
116	3	Specific XML interface for each function category for a device.	VCR.record category
118	4	Specific XML interface for each function in function category.	VCR.record.1dr function

FIG. 23

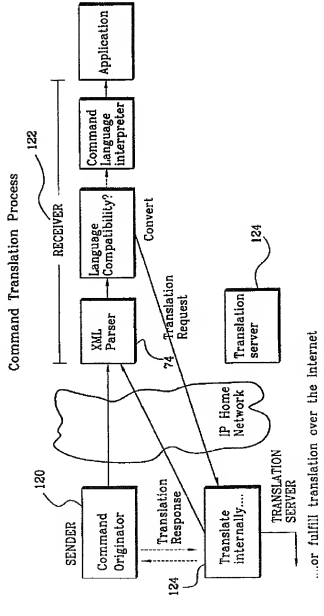

Command Translation Process
RECEIVER
122
Application
Command Language Interpreter
Language Compatibility?
Convert
XML Parser
Translation Request
Translation server
124
IP Home Network
120
SENDER
Command Originator
Translation Response
124
Translate internally....
TRANSLATION SERVER
....or fulfill translation over the Internet

FIG. 24

Table 3: Example Formats and Types

Type	Format
command	CAL, AV/C, X-10
image	jpeg, gif, bitmap, tiff
language	English, French, etc
video_stream	mpeg2
video_clib	avi, quickime, mpeg
text	html, plain
audio	wav, aiff
application	msword, pdf, postscript, gzip

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(74) Agent: LEE, Young, Pil; The Cheonghwa Building, 1571-18 Seocho-dong, Seocho-gu, Seoul 137-073 (KR).

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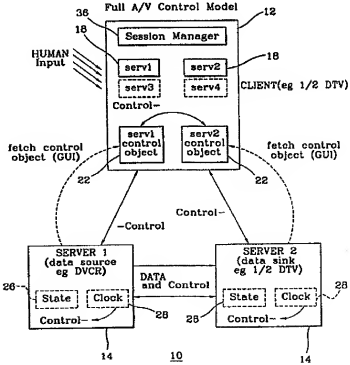
(57) Abstract

A method and system for performing a service on a home network, by: connecting a first and a second home device to the home network; providing a database including a plurality of application interface description data objects, where each application interface description data object includes information in a structured format for commanding and controlling of a home device by one or more other home device connected to the network; the second home device accessing a first application interface description object for the first home device in the database; the first home device accessing a second application interface description object for the second home device in the database; sending control and command data from the first home device to the second home device utilizing the second application interface description object over the network; and sending control and command data from the second home device to the first home device utilizing the first application interface description object over the network. Whereby, the first and second home devices perform said service.



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INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5546584 A (LUNDIN et al.) 13 August 1996 (13.08.96), abstract; fig. 1-4	1,9,12
A	WO 96/21189 A1 (COMPUSERVE) 11 July 1996 (11.07.96), claim 1; fig. 1A.	9
A	EP 0814403 A1 (H.P) 29 December 1997 (29.12.97), abstract; fig. 1.	1
A	EP 0784271 A2 (NEC) 16 July 1997 (16.07.97), claim 3; fig. 1.	1

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing adress of the ISA/AT Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/200	Authorized officer Mihatsek Telephone No. 1/53424/329

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Patent document cited in search report			Publication date	Patent family member(s)			Publication date
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				BR	A	9306654	08-12-1998
				CN	A	1080751	12-01-1994
				EP	A1	648354	19-04-1995
				FI	A	946194	30-12-1994
				FI	A0	946194	30-12-1994
				MX	A1	9303456	28-02-1994
				NO	A0	945054	27-12-1994
				NO	A	945054	06-02-1995
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				US	A	5680549	21-10-1997
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				US	A	5948056	07-09-1999